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You Can Lead a Horse to Water

By GILBERT L. LACHER
Managing Editor, THE IRON AGE

YOU can lead a horse to water, but you cannot make it drink." This adage sums up the arguments of those who hold that Governmental efforts to loosen credit are futile as a means of reviving business.

They point out that the National Credit Corporation, the Reconstruction Finance Corporation, the anti-hoarding campaign and the Glass-Steagall bill have all failed to arrest the contraction of trade and the decline of security and commodity prices. And the last emergency measure, i.e., large-scale purchases of Government securities by the Federal Reserve banks, will prove no more effective as a business stimulant than the others, they contend. Pumping additional funds into our banking system will increase the liquidity of our banks, they concede, but will not increase the flow of credit. In other words, to make credit available is no insurance that it will actually be used.

But let us examine this thesis in the light of past experience. In 1920 our banks became heavily indebted to the Federal Reserve system, their borrowings at the close of the year amounting to well over two billions of dollars. In 1921 the international flow of gold reversed and net imports of the yellow metal exceeded 650 million dollars. The inflow of gold, which continued through 1922, reduced the indebtedness of member banks at the Federal Reserve Banks.

Another purely fortuitous factor was a vigorous open market policy on the part of the Reserve banks in the first half of 1922. At that time central banking policy was not so well understood in this country and purchases of securities were resorted to in the belief that the Reserve banks, like individual banks, should seek earnings on their assets. The consequence was that from January, 1922, to May, 1922, inclusive, the Reserve system bought \$400,000,000 worth of Government

issues. These purchases, together with the gold importations, had the effect of freeing the member banks in the principal centers of most of their indebtedness to the Reserve system.

Finding themselves rid of debt and with idle funds, the reporting banks finally gathered the courage, first to invest their funds in securities and subsequently to increase their loans to customers. Records show that in June, 1922, when their borrowings from the Reserve banks had declined to 130 million dollars and their loans to a little over 11 billions, they increased their investments sharply. From that time on both loans and investments gained.

The lesson from this experience is that banks, which are in business to make money, will not keep their funds idle for long, once they have achieved a highly liquid position. If, at the current juncture, they have not yet achieved sufficient liquidity to satisfy their present exaggerated ideas of safety, the open market purchases of the Federal Reserve banks should soon put them in that position. If history repeats itself, it will be only a matter of time before the banks will get over their timidity and gain the courage to risk their funds in the bond market.

Such investments will have far-reaching effects on finance and business. They will raise the value of collateral. They will put an end to the fear of uninterrupted liquidation. They will encourage enterprise. They will make possible the financing of new undertakings, now held back because cash in hand is preferred to the best of risks.

Of course, the confidence necessary to produce these results cannot be created overnight. It will be the reward of patience. To put it another way, the mere act of leading a horse to water may not make it drink, but if you hold the horse there long enough, it will get thirsty.



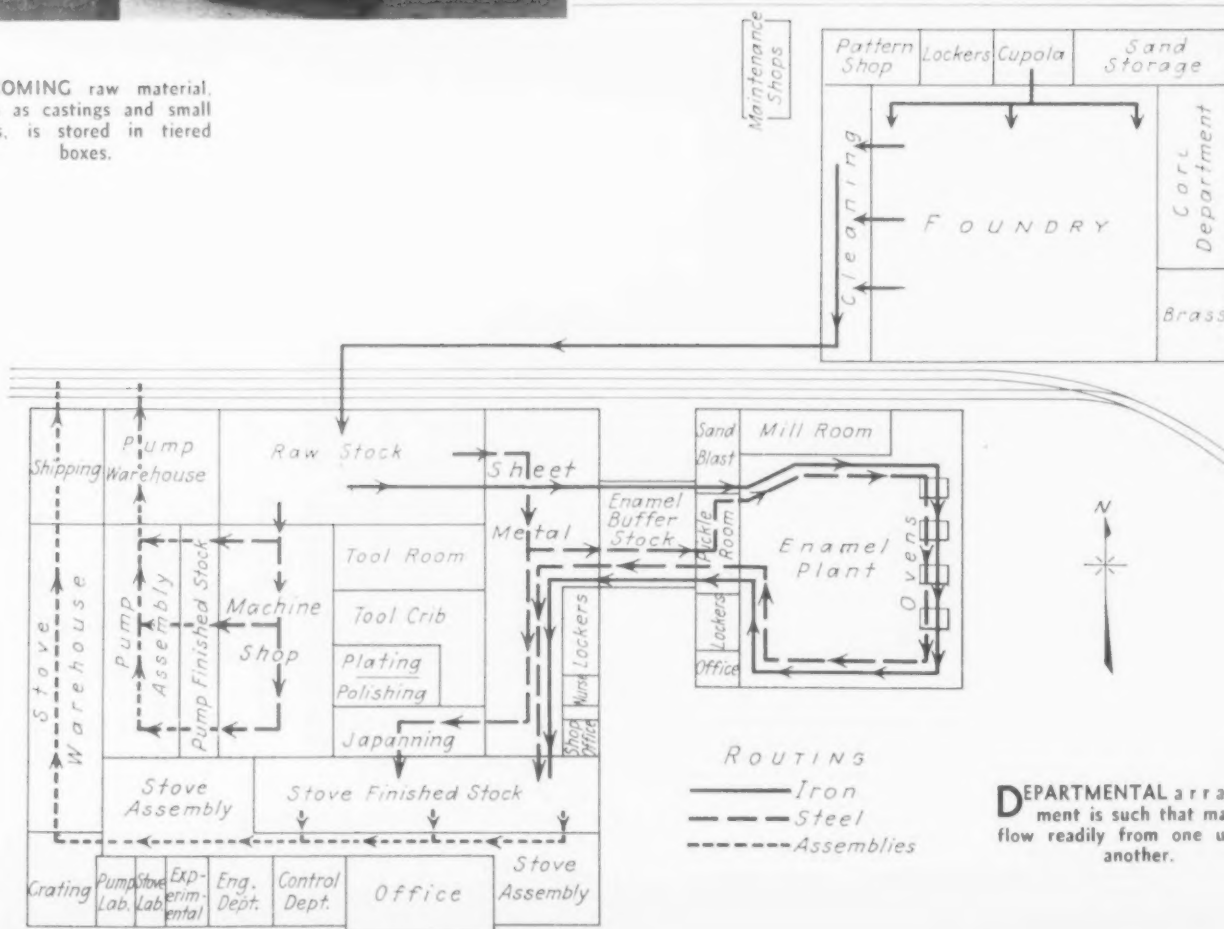
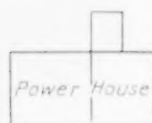
INCOMING raw material, such as castings and small parts, is stored in tiered boxes.

TOTE BOXES PLAY



A PRIMARY consideration at the plant of the George D. Roper Corp., Rockford, Ill., stove and pump manufacturer, is to store semi-finished parts in process in order to hold down inventory value. Besides its handling of semi-finished parts, the plant is featured by its line production, the coordination of one department with another, and the handling of finished material preparatory to use at the assembly line.

The plant consists of three units—a foundry, an enameling plant and a third building which houses raw stock, a machine shop, a sheet metal shop, finished stock storage and assembly. Finished steel mill products and non-ferrous metals and castings are delivered to raw stock storage, the



LARGE PART IN PUMP

By ROGERS A. FISKE
Chicago Editor, The Iron Age

AND STOVE PLANT

castings being delivered from the foundry in steel-frame wooden tote boxes. Overhead in this department are low-head cranes equipped with electric hoists. The boxes are built with permanent skids and there is sufficient head room to stack them three high. When a box is in place a steel frame is fitted over the top to form support for the skids of the box next to be placed on top of it. Slings used consist of a rigid frame from the corners of which are dropped round bar hooks.

Boxes are moved to processing points on handlift trucks. The general plan throughout this plant is to have unusually wide aisles which afford ample space for storage of parts in process and still have free passageway around all machines. Truckers freely circulating throughout the shop move full and empty boxes to and from machines.

Parallel with the machine tools on which pump parts are made are storage racks so that parts as they are finished move only across an aisle to stock. These bins are sized with smaller parts being stored above. The lowest row of bins is open at the floor line so that heavy parts may remain in storage in the boxes in which they were received from the machine department.

Finished pump parts move from storage across an aisle to the pump assembly, and finished pumps move directly to the warehouse, which is served by cranes as in the raw stock room.

Detailed thought given to materials movement in this plant is well illustrated by the set-up to manufacture brass gas valves. Machines are set in a row to perform the following operations,—drill hole, thread and hollow mill, rough ream and taper ream, quarter mill, and finish ream. Extending along the back of these machines is a narrow fabric belt. At each machine is a metal conveyor gate that sweeps parts from the belt to an inclined trough which discharges into

a metal pan. Near the upper end of each trough is a grid under which is a pan to catch cuttings which may have adhered to a piece when it was dropped on the belt.

Under the tip of each cutting tool is an inclined pan which connects to an inclined trough and thence discharges to the belt. This trough is also fitted with grids and a pan beneath to catch cuttings. With this scheme delivery of parts from one operation to the other is virtually automatic and machine operators waste a minimum of time in handling

parts to and from the machine fixtures.

After finish reaming the parts are moved across an aisle where assembly of the valve begins. This work is performed on a long bench. At the first station the plug is fitted in the body of the valve and each finished part is thrown along the metal surfaced bench to the next station. Immediately ahead of each station the table is inclined for a short distance and then it drops abruptly to form a pocket. When a part is thrown along the table its velocity is retarded by the incline



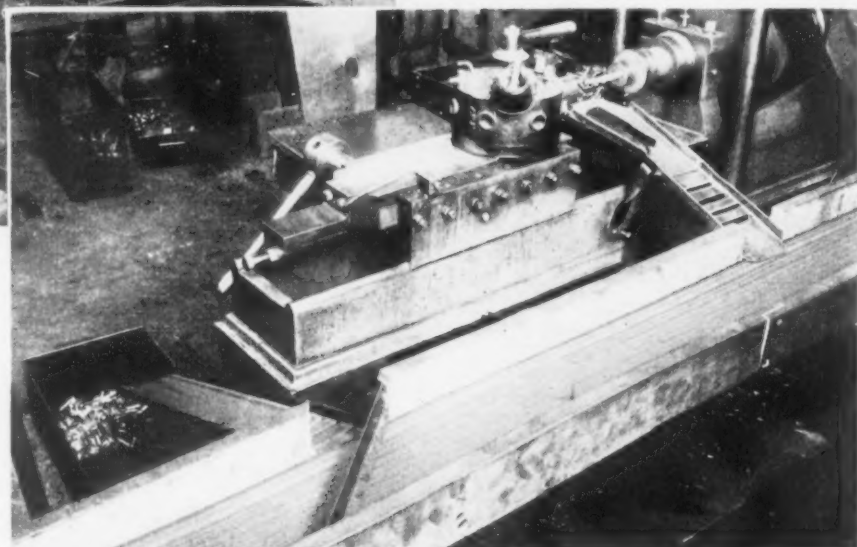
Finished pump parts racks are located between the machine department and the pump assembly line.



PARTS for stove assembly are placed in racks along a conveyor. These racks are filled from storage in the rear.



PRESSES stand in two lines separated by a wide aisle which serves as a storage space.

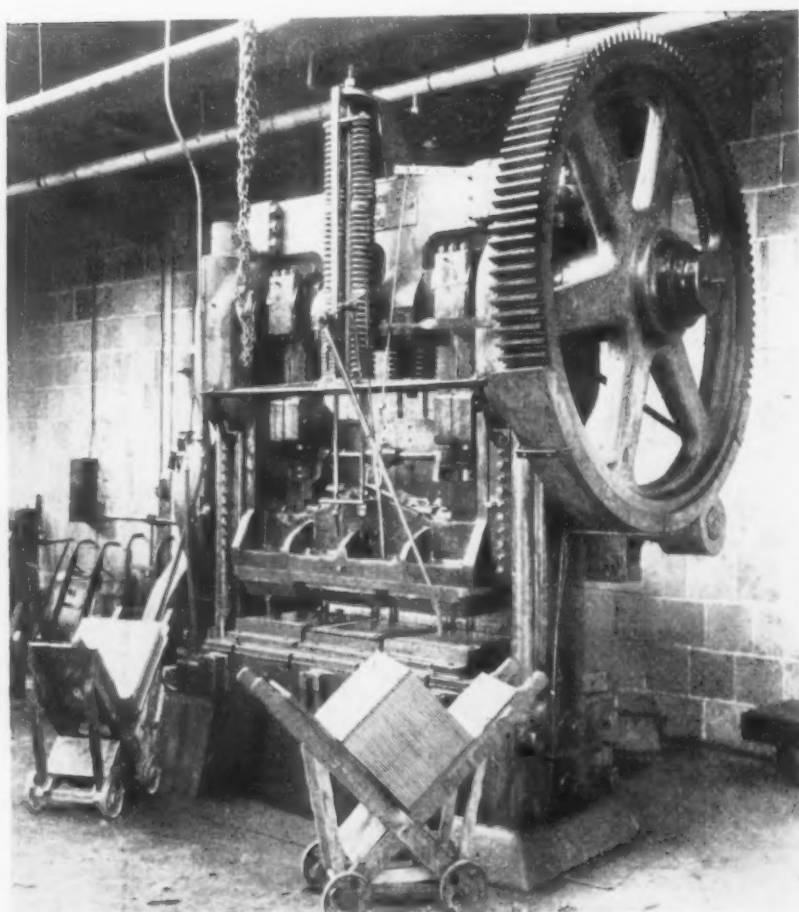


and it drops into the pocket within easy reach of the operator at the next station.

The tool room is located between the machine shop and the press room with one overhead crane running across the three floor areas.

Sheet storage is classified into small lot and large lot quantities. Small lots are placed in suitably marked racks and large lots are piled on the floor with wooden spacers to facilitate rehandling when called for use in the production department. An overhead

A narrow belt fitted with plow gates moves parts of gas valves from one machine to another in a line production plan.



crane lifts a quantity of sheets and places it on a high body truck which is pushed a short distance to a row of shears standing at right angles to the press lines. After sheets are sheared to size they are placed on trucks for movement to the presses.

There are two lines of presses, one along each wall. The main aisle is very wide affording ample storage to avoid interruption in supplies between the shears and presses and between the various press operations.

After blanking and forming the various steel parts in the press department this material is moved by trucks to the enameling plant, if such parts are to be porcelain enameled, or to the japanning department, if such parts are to be black japanned. From the enamel and japan departments both formed sheets and castings move in tote boxes, equipped with skids, to the general store room for finished parts. This is a reservoir from which parts are drawn for the stove assembly line.

The assembly department is designed with open floor space served

by overhead cranes equipped with electric hoists and there are bins for odd and small lots. Tote boxes are tiered three high as in the raw storage department.

The assembly line consists of a roller conveyor which extends the full length of the finished parts storage department. At the crating station this conveyor drops down to a few inches above floor level and branches into two tracks one running down each side of the stove warehouse. A crated stove may be moved on this conveyor from the last operation down the length of the warehouse to within a few feet of the shipping department door.

Extending along the 284 ft. length of the assembly line are wooden racks. Supplies of finished parts are drawn on a schedule from finished stock and placed in the rack at points where they are needed for assembly. These racks are built high so bulky parts or parts used in large quantities may be moved to the assembly line in tote boxes from which the assemblers draw their needs.

Workers on the assembly line stand between the conveyor and the supply racks. Three service men fill the racks from general stock. They work on the opposite side of the rack from the assembly men. Small parts, such as screws and bolts are placed in metal pans hooked to the conveyor frame. Sub-assemblies are made in similar manner along conveyors placed at right angles to the main unit.

Basically the idea at this plant is to store all parts and material in special containers. Over 4000 skids and 7500 boxes are in use in addition to the various types of trucks used. This plan provides a portable method of stock handling and it gives a visual



The conveyor drops to floor level at the crating station.

method of stock control which has proved helpful in supplying the various assembly lines.

Enameled Steel House to Be Shown at Fair

A porcelain-enameled metal house built to meet the requirements of a small family will be one of the features of the Home and Industrial Arts show at Chicago's 1933 World's Fair.

The contract for the construction of this house was signed by the American Rolling Mill Co., Middletown, Ohio, the Ferro Enamel Corp., Cleveland, and officials of the exposition. The house will be finished in bright, shimmering porcelain enamel, fused on sheet metal. It will never require painting. A bath with a garden hose will remove any grime that collects on its surface. The house will be fire-proof, vermin-proof and insulated against heat and cold. It will be of modern design to conform with the architectural scheme of the exposition.



Workmen stand between the supply racks and the assembly conveyor.

STEEL HOUSING HAZARDS

By ROBERT TAPPAN

Architect,

445 West Twenty-third Street, New York

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MY studies and practical experiments during the past five years have convinced me that an intelligently designed steel framed, fire-safe house can be constructed as economically as an average wooden house of the same capacity, and that it can be equipped with the same or better accessories. Starting from the cellar floor with a complete steel skeleton composed of simple, standard structural shapes, it is possible to copy in miniature the same time-saving economies that enable us to complete a gigantic office building in twelve months. I visualize one week as being an ample time allowance for the construction of a six roomed, steel framed house, designed to cost \$4,000 or less. It would be difficult to calculate the time required to reproduce a modern office building without using structural steel, but it is not hard to appreciate the time-saving possibilities that the steel skeleton offers the builder of small homes.

A complete small house steel skeleton, itself erected in about four hours, permits the simultaneous conduct of many other operations that ordinarily require weeks of waiting. It also permits the application of many new and improved methods of wall, floor, roof and partition construction.

Steel skeleton construction is still so new that we have failed to grasp its fullest potentialities. Shipbuilders are way ahead of us, and so are many manufacturers who are not primarily concerned with architecture, but who have discovered that steel can be economically used in place of traditional materials. We still clothe steel skeletons with masonry in spite of shipbuilders and car builders. Clinging to ancient forms and prejudices, we try to reproduce the old with more enthusiasm than sense. At economic housing problems we either shrug our shoulders or form organizations or commissions to study the subject. Radicals are always in a hurry, impatient at delay and prone to stigmatize conservatism as stupidity.

THE steel makers must carry the brunt of the work of promoting the steel house—this is the contention of the author. At least they will have to support broadly a campaign of education respecting a new class of structures which may easily represent a revolution rather than an evolution from traditional practices. The several groups concerned with house building are, until they become exponents of the change, obstacles to progress, or, as put by Mr. Tappan, hazards. Negotiate the hazards and then will it be possible to usher in a new era in residential economy.

▼ ▼ ▼

In my own enthusiasm for the steel-framed, fire-safe house idea, I sometimes forget that its progress is handicapped by as many hazards as there are on a well laid out golf course.

Hazard No. 1—The Home Buying Public

During the past fifteen years there has been an enormous increase in the value and attractiveness of housing accessories. Many of these items are found in even the cheapest speculative home. An honestly built residence, equipped with the standard accessories of fifteen years ago, would fail miserably in competition with a shoddily built house of today with its brass piping, trick heating, electrical conveniences and gorgeous bathrooms. The home buying public has been taught to demand and expect luxurious and showy equipment. It

has not been taught to value sound construction.

Hazard No. 2—The Speculative Builder

In his frantic efforts to provide the contents, he has been forced to economize on the container. He cannot be bothered with improved methods that promise to add a penny to construction costs, unless the public demands them. In some districts, by almost superhuman sales effort, metal lath has been accepted in place of wood lath, and fire-resistive roofing materials in place of wood shingles, but, generally speaking, the average cheap house of today is a surprise package, "wrapped in cellophane."

Hazard No. 3—The Money Lender

Lending institutions, in prosperous times, are only too willing to advance funds to shoddy builders. They do not object to the introduction of better building materials, but offer little inducement. Until more emphasis is placed upon sound construction by the lender, existing conditions may be expected to continue.

Hazard No. 4—Fire Insurance Companies

Fire insurance can be a curse instead of a blessing. Possession of a policy lulls the home owner into a false sense of security—at a price. American homes burn down at the rate of about one every five minutes. Who cares? Lives are lost, suffering and inconvenience experienced. Every policyholder pays the bill.

Fire insurance companies could encourage safer construction by forming a "Life Extension Institute" for homes.

Hazard No. 5—The Lumber Industry

The manufacture, distribution and consumption of lumber is an important international business of tremendous strength and influence, with deeply rutted channels of tradition, custom and investment. Its leaders are keenly conscious of every movement calculated to reduce the demand

for lumber. They may be counted on to combat directly and indirectly any serious effort to popularize the use of steel framing in fields where wood has been commonly employed.

Hazard No. 6—The Carpentry Trade

An ancient and honorable craft, numbering several hundred thousand. Its members cannot be blamed for resisting all attempts to introduce processes that may deprive them of a livelihood. It is a far cry from the old time skilled craftsman to the average contemporary "hammer and saw man," but even today his services represent a very important cost item in the throwing together of the average American home.

Hazard No. 7—The Steel Manufacturer

Of all people! Thinking, working, dreaming in terms of huge tonnages, how may he be expected to bother with the retail poundage involved in one little six-room cottage? His conception of production and distribution is still primitive. Like wheat and cotton, structural steel is subject to economic difficulties that might be improved by more intelligent distribution. The potential market for structural steel is a gigantic one, limited only by the demand for new buildings of all types, in all countries. Wherever wood or masonry construction is now employed there is both an opportunity and an excuse to crowd them out.

The lumber manufacturer has been in the field long enough to learn that it pays to neglect no possible markets. Even packing cases are studied and improved and the results broadcast to a receptive public. But steel is supposed to sell itself. So is wheat, but does it? Until the great producers of structural steel really try to popularize the use of simple standard shapes for home construction, I look for very little progress. Like the

weather, many steel leaders talk about it, but action is lacking.

Hazard No. 8—Architects

Here and there I find architects who are mildly interested, but homes costing from three to five thousand dollars really are out of their sphere. The average architect may shudder when he views row after row of ugly and cheap products of the speculative builder and wonder how intelligent human beings can bring themselves to live in them. But he manages, like the Pharisee, to pass by on the other side.

Hazard No. 9—Enthusiasts

Many enthusiasts, myself included, have wasted time and money attempting to develop trick solutions of the problem. They have conceived the steel framed house as a patented novelty. But patented processes are too expensive when equivalent results can be obtained by unpatentable methods. The individual house problem is far too complicated to be solved so simply. Home construction is handicapped by the craftsmanship tradition. It is impracticable to assume that the customs and traditions of centuries can be ridden over rough shod. Too many sore toes are waiting to be stepped on.

Educational Campaign the Need

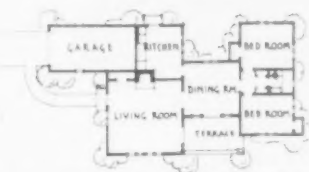
THESE are a few of the difficulties in the path. But every difficulty is man's opportunity. They are what make the game worth while and lend zest to the contest. In order to make progress I would suggest that the great steel producers plan an educational campaign to popularize the intelligent use of standard steel shapes for all classes of small structures, with the eventual object of securing a wide distribution of standard structural steel through established building material dealers.

I would have them broadcast expert designs for all classes of minor struc-

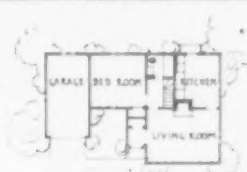
tures, ranging from chicken houses to chapels, using a unit system of design that will insure the greatest possible employment of similar shapes, sizes and connections. I would have them encourage the builders to switch over to steel skeleton construction, by stressing the important time saving economies inherent in its use. I would bombard the public with national advertising and encourage architects, builders and material dealers to play up every disastrous fire, tornado or earthquake with appropriate copy in the local papers. I would have them act as a clearinghouse of information, distribute a trade magazine. In short, I would have them make the public steel skeleton conscious.

Expensive? Naturally, but what of it? If I manufactured an improved chewing gum, safety razor or building material, I would expect to have to tell the world about it. The better mouse trap theory will not work in this age of the new competition, with industry fighting industry for tremendous markets.

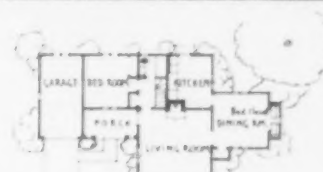
We are just emerging from the handicraft era. Wood framing and load-bearing masonry construction both are products of handicraftsmen. They have served their purposes in the past, but today seem to be decidedly out of step with the times. Steel skeleton construction is comparatively new. Its possibilities in connection with new methods of enclosure still wait exploitation. New ways have been and will be developed to form walls, floors, partitions and roofs that will permit small steel-framed homes of fire-safe construction to be assembled in fewer hours than it took days to do the work formerly. Speed in the field is the solution of the small house problem. A complete steel-framed, fire-safe home, assembled in one week, will save enough field labor expense to pay for better building construction and even more elaborate and luxurious equipment.



FIVE ROOMS AND GARAGE



THREE ROOMS AND GARAGE



FOUR ROOMS AND GARAGE

THESE suburban cottages represent one phase of the Tappan system of unit wooden construction. Fabricated in a factory and erected by carpenters at a labor hour saving of 66 per cent, they can be completed on Long Island, New York, in 1932 for 33c. a cu. ft. Constructed of standard steel and reinforced concrete they can be completed, Mr. Tappan says, for 28c. a cu. ft. Erection time for wooden construction is two weeks; erection time for steel and concrete construction, 10 days.

PURCHASING AND HANDLING

USE of heavy fuel oil immediately brings to the operating engineer's mind plugged fuel lines, burner trouble, solidification of the oil in cold weather, incomplete combustion, and numerous ailments, all leading to shut-downs. However, with a fuel oil system of proper design and with a reasonable amount of care in the purchase of fuel oil he will find that his troubles are for the most part visionary.

Heavy fuel oil will show a gain in heat exchange, a more uniform fuel and one easier to obtain. Fuel oils are sold on a volume basis, heavier oils are lower in price, there are more pounds per gallon and more heat units in each gallon. At the present time when economy in manufacturing has to be practised to the *n*th degree in order to meet competition it is worth while to know the properties and the correct handling of low-gravity fuels.

Some of the better grades of heavy fuel oils on the market are from cracked residuum and they are quite often better than the lighter fuel oils taken from distillate plants. These heavy fuels run from 9 to 15 gravity, and can be obtained with less than 1 per cent of sulphur and sediment and a cold test around zero; if handled properly they do not give any operating trouble.

The light fuel oils known as distillate fuels are supposed to be obtained from the atmospheric distilling of crude stock and to represent the remains after gasoline, naphtha, kerosene and other volatile distillates are removed, but the refineries also take

the heavy residue from the stills and blend it with lighter oils until it meets the specification of the customer. These cut-back oils contain considerable lubricating oil and other higher volatiles which have a tendency to separate and cause trouble in burning. The lighter fractions are similar to kindling wood in a fire and have little value as heat units. They often gasify, causing trouble at the burner, and if the temperature of the oil is lowered to overcome this difficulty there is not sufficient heat to atomize properly the heavy residue. These troubles are eliminated to a great extent when burning heavy fuel oil. The high volatile fraction in light fuel oil is also a fire hazard in the storage of oil.

Specific Gravity Misleading

Most fuel oil is purchased by the specific gravity of the oil. This is misleading, as fuel oils of the same gravity have different properties. Nearly 300 hydrocarbons are found in and produced from petroleum. The most important items to consider in fuel oils are viscosity, flash point, cold and pour test, the amount of sediment and water, known as B.S. and W., (bottom sediment and water) and the sulphur content.

Two gravity scales are used in the oil industry, one known as the Baume adopted by the United States Bureau of Standards and the other is known as A.P.I., used by the American Petroleum Institute. The difference between the two scales is very slight for liquids lighter than water, which covers most fuel oils. In this article the

Baume scale will be used, and heavy fuel oils will be considered as those having a gravity of 15 or lower, Baume scale. Oil with a 10 deg. gravity is an approximate low limit for fuel oils unless special equipment is used. A number of large buyers of fuel oil do not specify the gravity, as they consider the proper consistency of the oil at working temperatures more important. The United States Navy standard specifications call for a flash point not lower than 150 deg., viscosity (Saybolt Furol) 100 sec. at 77 deg., B.S. and W. less than 1 per cent and sulphur under 1.5 per cent.

No Difficulty in Burning High Viscosity Oils

There are several systems for measuring the viscosity of oils, but the best known for fuel oils are the Saybolt Universal and Saybolt Furol. The Universal readings are about ten times as high as Furol readings. The viscosity of fuel oil is generally determined at 122 deg. F. (50 C.); 104 F. (40 C.); 77 F. (25 C.). Fuel oils of low viscosity are preferred, but no difficulty is experienced in burning high viscosity oils in a properly designed system. Heavy fuel oils showing high viscosities are rapidly lowered as the oils are heated.

The flash point is very important to the operating engineer, as it is a guide for the proper heating of the oil. A 30-deg. gravity oil will require a temperature of 125 to 150 deg. and a heavy 10 deg. oil should be heated around 300 deg. in order to obtain the proper atomization. A good rule to follow is to have the temperature of the oil around 50 deg. lower than the flash point. Tests for flash point should be made according to the American Society for Testing Materials' method.

Flow and cold tests are essential especially during cold weather. Some oils solidify at moderate temperatures, causing trouble in pumping. Heavy fuel oils are on the market having a low gravity that will remain liquid around zero temperatures, others will solidify around 40 deg. The lighter oils vary almost as much as the heavy oils. An oil to handle easily should show a low pour test and there should not be over 5 deg. difference between the pour and cold test.

Heavy oils are inclined to contain

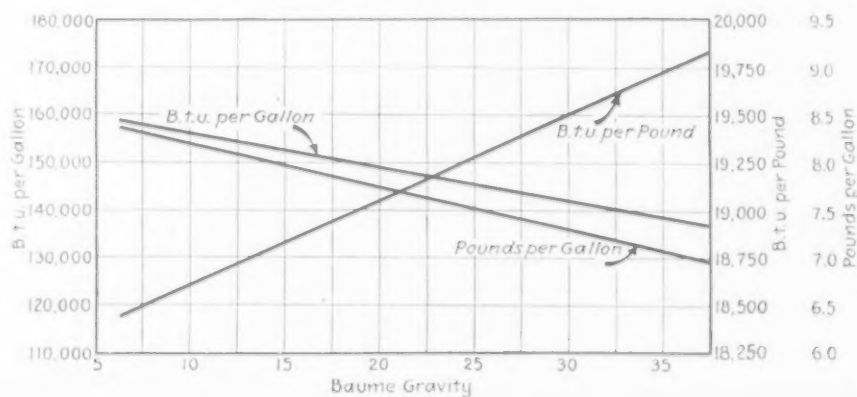


FIG. 1
Chart showing the B.t.u.'s per gallon, B.t.u.'s per pound and pounds per gallon of fuel oil at specific gravities ranging from 5 to 40, Baume scale.

NG OF HEAVY FUEL OIL

By **HARRY SPILLMAN**
Manager, Power Division,
Continental Motors Corp., Muskegon, Mich.

an abundance of sulphur, running as high as 5 to 6 per cent. Since sulphur has great affinity for iron, its content should not exceed 1 per cent for most steel metallurgical operations.

The sediment and water in the oil, known as the B.S. and W., should not exceed 1 per cent, as it gives trouble at the burners. Small burners require oil low in suspended matter. Heavy fuels have a tendency to run high in B.S. and W.

Fixed carbon does not materially affect the oil unless the amount exceeds 10 per cent. This is an indication that the oil has been burned and mistreated at the refinery and a large quantity of fine carbon in suspension gives trouble at the burners.

Some purchasers of fuel oil also specify a loss test of 5-hr. duration at 325 deg. F. If there are light oils present in the fuel oil there will be a loss running as high as 20 per cent.

It is interesting to note (see Fig. 1) that a gallon of fuel oil at 35 gravity will contain about 138,000 B.t.u. If the oil has a gravity of 10 it will contain 155,000 B.t.u., an increase of 17,000 heat units, or over 10 per cent. When buying light fuel oils additional dollars are being paid out for high gravity, low flash point and viscosity and less heat units.

Heating Heavy Oil Assures Proper Atomization

When designing a system for handling heavy fuel, heating of the oil should be given paramount consideration in order to assure proper atomization at the burners. Each burner should obtain an even, uninterrupted supply of fuel. The oil pressure should be constant because any variation will cause poor combustion and uneven atomization. Fig. 2 shows a parallel circulation system that will burn heavy oils in an efficient manner and will give an even temperature oil at the burners at all times. The starting up and closing down of any burners does not affect the pressure and the system allows any number of burners to be controlled from one valve. In designing a system of this kind a complete circulation must be in each branch line right up to the burners, as a dead end will cause uneven fires and plugged burners due to the collection of water and sediment.

In laying out the piping a good rule

SUCCESSFUL use of heavy fuel oil, with its lower price and other advantages, is shown to depend upon care in purchasing and upon correct handling. In view of the possible operating economies through use of low-gravity fuels, Mr. Spillman's discussion of the properties of these oils and the proper design of the handling system should interest metallurgical as well as operating engineers in all branches of metal working.

to follow is to use 2½-in. pipe for all lines over 500 ft. long, 2-in. pipe for lines under 500 ft. and ½ and ¾-in. pipe for branch lines. The piping should be designed so that the entire system will drain itself when shut down; this will avoid oil congealing in the pipes. In case any section of piping is liable to give trouble by oil solidifying a small steam pipe should run parallel to the oil pipe and the pipes covered as one unit.

Duplex oil strainers should be used, allowing one strainer to be cleaned

without interfering with the operation of the system. One set of strainers should be on the suction side of the pumps having sufficient size mesh to allow good pump action. A set of fine mesh strainers should be in the discharge line and duplex strainers on each individual furnace. These strainers should have about 60 mesh per inch.

The pumps should be steam-driven reciprocating or electric-driven rotary. One pump should be used at a time, having sufficient capacity to circulate twice the maximum quantity of fuel used with a reserve capacity of at least 50 per cent.

Oil heaters with a temperature control are required to maintain the desired temperature. It is better practice to use two or more small heaters scattered along the line in preference to one large one. These heaters will then act as boosters and a far better temperature control will be maintained in the system.

Installation of constant orifices on the discharge side of each branch line will give proper circulation in all the branches. A pressure regulator at the pump will maintain a constant pressure with a relief valve on the return loop. The pressure regulator should be set a few pounds above the line

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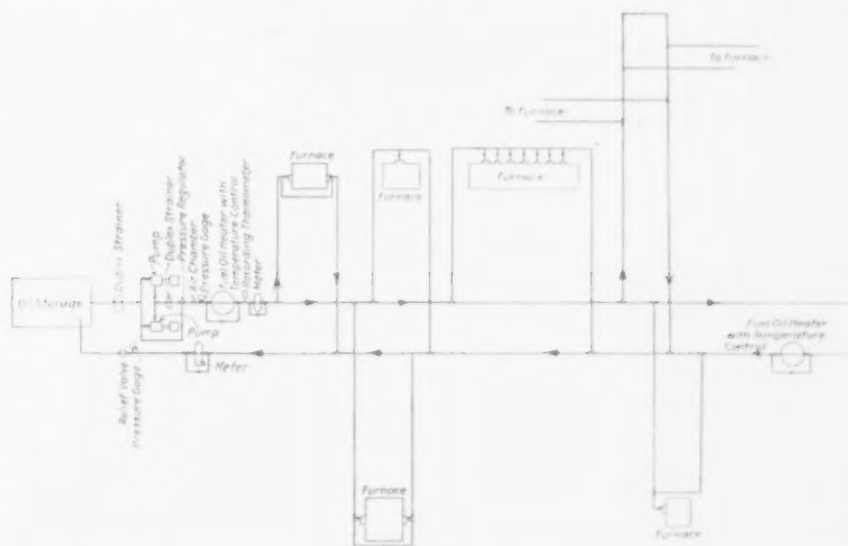


FIG. 2

Parallel circulation system designed to burn heavy oils efficiently and assure even temperature oil at the burners at all times. Starting and closing down of burners does not affect the pressure, and any number of burners can be controlled from one valve.

MELTING GRAY IRON IN THEE

THE development of the far-reaching possibilities of cast iron has had to await introduction of furnaces which would permit production under conditions of positive control, yielding high temperature iron of any desired analysis. This has been accomplished recently through the perfection of the electric furnace in which high-test cast irons are being made.

Wide Range of Products

Resulting materials cover a wide range: High-silicon, high-carbon iron for a soft dense iron of extreme machineability; low-carbon, medium-silicon iron for high strength, shock resistance and ready machineability; or low-carbon, alloy irons for extreme high strength, impact value, wearability, heat resistance or other definite physical requisites. To obtain this variety of products it is only necessary to proportion properly the materials charged and follow a simple, routine method of operating the rocking type of indirect arc electric furnace.

In using the electric furnace, the foundryman has the choice of three methods: (1) Melting entirely from the cold, (2) duplexing and (3) a combination of cold melting and duplexing. His decision should be based on local conditions. On the large tonnage schedule, the cupola is a cheap

melting medium and the low cupola conversion cost should be utilized, if possible, to obtain the economy from charging molten iron into the electric furnace instead of melting cold iron electrically. On the other hand, the cupola loses much of its melting economy on restricted output.

In the case of automotive and other foundries having cupolas which are tapped continuously 8 or 9 hr. a day, all possible melting operations should be done in the cupola and the metal subsequently processed in the electric furnace. This process may consist of (1) duplexing, that is, mixing and superheating, as in cylinder block production where it is not necessary to change the analysis of the iron from that of the cupola product; or (2) "triplexing" or charging both solid and molten materials, as in the manufacture of brake drums, clutch plates or other articles where it is desirable to turn out a final product of different composition from that of the molten cupola iron. In such cases cold steel scrap, together with any essential ferroalloys, is added to the molten cupola iron in the electric furnace.

It is not feasible to use loose borings and turnings in the cupola, as they cause a badly oxidized melt and high loss of metal due to the action of the air blast on finely divided materials. Hence such scrap is added

cold in the electric furnace, even though the main process be one of duplexing. If the process be cold melting, the charge may consist of borings and fine scrap in any proportion. The necessity for "triplexing" arises only with high-test gray irons in making products of unusual specifications requiring definite analyses different from those of the molten cupola iron charged.

Making Malleable and Heat-Treated Castings

The manufacture of "short anneal" malleable and heat-treated castings is a special process by which products of high tensile strength (50,000 to 100,000 lb. per sq. in. and of 2 to 15 per cent elongation) may be secured. These products are frequently made synthetically in the rocking indirect arc furnace. The process calls for charging into the electric furnace steel scrap and sufficient petroleum coke to give the desired carbon content in the finished iron, and then pouring from the furnace a white iron of such analysis as to be susceptible to a short anneal and subsequent heat treatment. This composition is commonly 2.50 per cent carbon and 1.40 to 1.70 per cent silicon, depending on the casting section.

The annealing operation is usually for 3 hr. at 1750 deg. F., the further treatment (rate of cooling, soaking time and temperature) depending on the castings and properties desired. Tensile strength of 50,000 to 60,000 lb. per sq. in. with 10 to 15 per cent elongation may readily be obtained. By suitable cooling and further treatment, tensile strength of 80,000 to 100,000 lb. is obtained, this product having an average elongation of about 2 per cent.

In the production of rustless and heat-resistant alloy irons and steels, the work done so far has been cold melting, charges consisting of scrap (previously alloyed materials of the same or similar compositions) and pig iron (for alloy, heat-resistant iron of high carbon content) or steel scrap, plus the necessary ferroalloys. Charges composed entirely of "18 and 8" scrap (18 per cent chromium and 8 per cent nickel) have been handled, giving a product of high quality, thoroughly uniform and of the same analysis as the charge. Other alloys containing as much as 30 per cent chromium or 35 per cent nickel for high-temperature, high-pressure, heat-

Data on Costs of Electric Furnace Iron

One foundry operating a 500-kw., 3000-lb. rocking type electric furnace and using gray iron borings, scrap and returns, found that its costs were as follows:

	Per Ton	
Power: 560 kw. hr. at 0.0125c.	\$ 7.00	
Electrodes: 8 lb. at 19c.	1.52	
Refractories: material and labor	1.00	
Maintenance: repairs and supplies	.20	
Labor: Operator at 75c. per hr.		
Helper at 50c. per hr.		
Production 7 tons per day—9½ hr.	1.70	
Total melting cost per ton charged	\$11.42	\$11.42
Material Cost:		
Charge—25 per cent borings at \$6 per ton	\$ 1.50	
30 per cent returns at \$12 per ton	3.60	
45 per cent scrap at \$14 per ton	6.30	
Average	\$11.40	\$11.40
Total cost per ton charged		\$22.82
With 1.5 per cent metal loss, total cost per ton of metal in the ladle		\$23.17

THE ELECTRIC FURNACE

By ALBERT E. RHOADS

Vice-president

Detroit Electric Furnace Co., Detroit

resistant castings are being melted with notable economy and improved metallurgical control.

The indirect arc rocking electric furnace operating on cast iron achieves the following results:

Produces a high degree of superheat easily, quickly and under accurate control.

Produces any desired predetermined analysis in the hands of ordinary labor and without complicated control methods.

Maintains reducing or non-oxidizing melting conditions within the furnace from heat to heat to insure a completely deoxidized melt.

Mixes the metal to produce a uniform product.

In the rocking type of furnace, the rocking feature provides for automatic washing of the entire inner refractory structure, except the door section, so that the body of the furnace is little hotter than the metal itself; thus excessive punishment of refractories is avoided. The arc is struck between two horizontal electrodes, the metal not being a part of the electric circuit. The heat applied to the metal, therefore, is uniform and under effective control, thus avoiding the danger of localized overheating of the metal. The furnace neither needs nor uses a slag, thereby eliminating silicon pickup from the slag. Melting and superheating are accomplished in a relatively closed non-oxidizing melting chamber, permitting a charge to be melted or duplexed and poured without change in analysis within the limits of error of analysis.

How Borings Can Be Handled

Charges made up entirely or in large part of borings, turnings and similar finely divided materials are utilized. Thousands of heats of all borings have been melted in the rocking furnace. However, it is customary to run charges of a combination of available borings and turnings together with sprues, gates and cast iron and steel scrap. Charges frequently average 50 per cent borings. When a limited quantity of borings is at hand (10 to 15 per cent of the charge), the remainder of the charge usually consists of cast iron and steel scrap.

Furnace additions of steel scrap, coke, ferroalloys or other materials are made through the furnace spout, in many cases without interrupting the furnace operation. The arc may

be kept applied and the automatic rocking maintained, frequently at a reduced angle of rocking. Thus, the material enters the molten bath under non-oxidizing conditions at high temperature and with a vigorous mixing action.

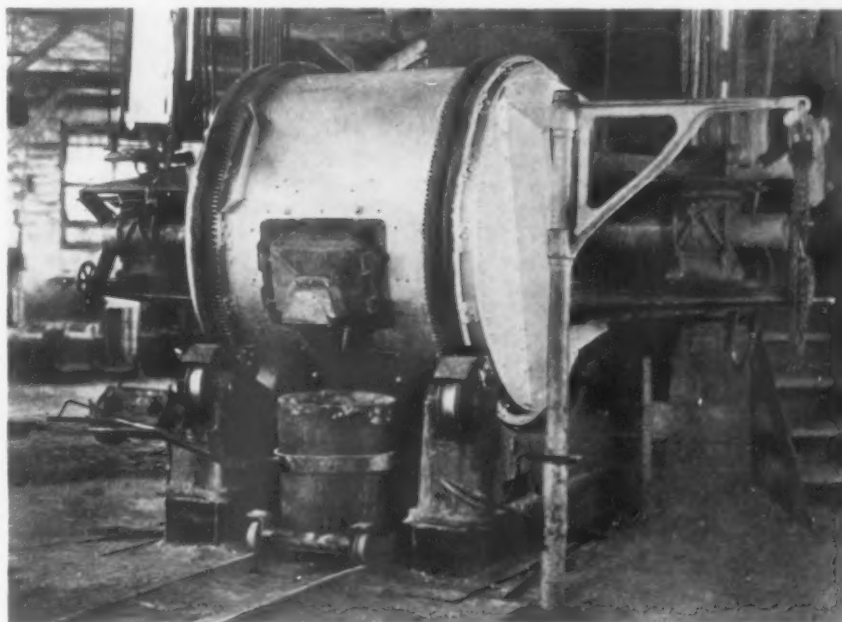
The furnace may be run on a batch system, that is, emptying the furnace after each heat, or on a continuous cold melt or duplexing basis, whereby a substantial pool of molten metal is maintained in the furnace throughout the day, definite amounts being tapped and recharged at stated intervals. Either the continuous or batch system may be followed for cold melting, duplexing or triplexing, provided the same composition is to be poured throughout the day. If the analysis must be changed frequently, it may be necessary to drain the furnace and run different batches.

A Weightograph Regulates Metal Used

At the Erb-Joyce Foundry Co., Vassar, Mich., the 600-kw. rocking indirect arc type electric furnace, with a capacity of 3000 lb. of metal, is mounted on a 20-ton scale having a 10,000-lb. weightograph, the entire

supporting mechanism of the scales being below the floor level. The weightograph consists of an accurately graduated scale mounted under a magnifying glass. Weighing is automatic and practically instantaneous as molten or solid material is charged into or poured from the furnace. The scale and weightograph reading is to within 5 lb. in 10,000 lb. This system saves time and labor normally consumed in duplicate and manual weighing. It also gives close metallurgical control. This installation is used both for cold melting and duplexing in the manufacture of tappets and piston rings. Unusually close control of composition is maintained in securing the precise depth of chill required in casting tappets with a chilled head and machineable stem.

A number of automobile plants are using the rocking type furnace to produce a variety of automotive castings by all three processes, cold melting, duplexing and triplexing. Of the two largest such installations, one consists of six 2000-lb. furnaces for cold melting scrap and pig in the manufacture of high-strength, heat-treated castings. Several of these products are given a quick anneal for malleability.



A 3000-lb. electric furnace is mounted on a 20-ton scale at the Erb-Joyce Foundry Co., Vassar, Mich. Weighing is automatic as the material is charged into or poured from the furnace, which is used for cold melting and duplexing in the manufacture of tappets and piston rings.

ing, while others are alloy irons which are successfully nitrided.

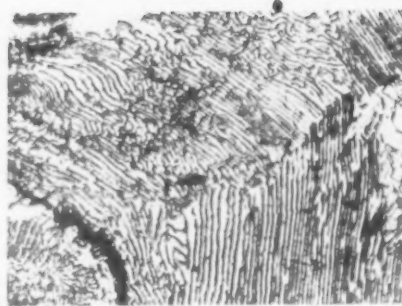
Molybdenum Alloy Iron for Brake Drums

The other installation consists of a battery of four 600-kw., 3000-lb. furnaces of the rocking indirect arc type, each holding 5000 to 6000 lb. of molten metal. The charge for each furnace is made up of 4000 lb. of molten cupola iron and an average of 1000 to 1200 lb. of cold steel scrap. The furnaces are used principally for the manufacture of brake drums and clutch pressure plates, which are made of a low-carbon iron containing 0.5 per cent molybdenum and which have a tensile strength of over 60,000 lb. per sq. in.

The brake drums have a Brinell hardness of 250 to 255 with excellent machineability and definitely superior physical properties from an engineering standpoint. Likewise, the clutch plates are made of molybdenum iron, insuring high strength and superior wearing qualities. As much as 35 per cent cold steel scrap has been added to the molten cupola iron in the electric furnace to produce the desired composition, the exact amount of steel depending on the type of molten iron being used. All brake drum and clutch plate iron is superheated to 2900 to 2950 deg. F.

In this, as in several other rocking furnace installations in automobile foundries, cylinder block metal has been duplexed by tapping molten cupola iron into electric furnaces, where it is mixed and superheated. No adjustment of analysis is necessary during this process. The electric furnace treatment adds 15 to 20 per cent to the strength of the cylinder block castings and gives a like improvement in other physical properties.

For cylinder block iron a superheat to 2850 deg. F. is regarded as sufficient. A number of manifolds also have been made of electric furnace iron to obtain improved dense, tight grain structure and smoother surface texture and to eliminate the segregation of the constituents of the iron. The latter is important in the case of



PHOTOMICROGRAPH of alloyed brake drum iron from electric furnace, showing lamellar pearlitic structure at 750 diameters. Analysis is total carbon 2.25, silicon 2.50, manganese 0.70 and molybdenum 0.50 per cent. Tensile strength is 66,000 lb. per sq. in., and Brinell is 255.

manifolds which are to be porcelain enameled, for it is known that flaking or scabbing of the enamel is usually accompanied or caused by a segregation under the blister or scab; that is, in the spot under the blister is a localized condition of non-uniform analysis of the iron.

Figures on Energy Consumption

The duplexing speed of each of the large furnaces is 2000 lb. every 20 min. or 3 tons per hr., provided not more than 12 to 15 per cent of cold steel scrap is added to the cupola iron. Power consumption on straight duplexing of cylinder block iron averages 55 to 72 kwhr. per ton of metal (2600 deg. cupola iron mixed and heated to 2850 deg.). When adding cold steel scrap, one must figure on an energy consumption equivalent to 600 kwhr. per ton of cold material. On the basis of charging 85 per cent molten cupola iron and 15 per cent cold steel scrap for producing brake drum metal superheated to 2900 deg., the energy consumption is as follows:

	Kwhr.
85 per cent molten iron at 100 kwhr. per ton.....	85
15 per cent steel scrap at 600 kwhr. per ton.....	90
Total power required per ton.	175

Gray iron manifold castings for ammonia pressure purposes and mal-

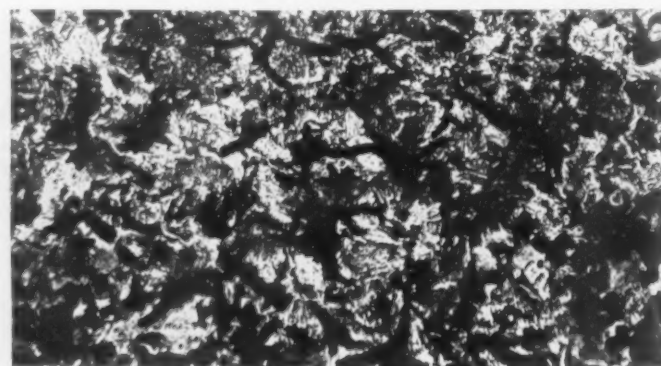
leable iron connecting rods for compressors are made from electric furnace iron by the York Ice Machinery Corp., York, Pa. For more than a year a 400-kw., 2000-lb. furnace has been used on alternate heats of gray iron and malleable, the charges of borings and cast iron and steel scrap being melted from the cold and superheated to 2950 deg.

During a day's run of six heats, the company sometimes pours four different kinds of iron: Ordinary gray iron for small pressure castings, low-carbon gray iron with 2 per cent nickel for manifolds, high-phosphorus iron for piston rings, and malleable iron for large connecting rods. The normal gray iron charge consists of 60 per cent cast iron borings and 40 per cent scrap and sprues. Ferrosilicon is added to prevent undue hardness and for certain classes of complicated, thin-walled castings. Steel is added to close the grain and 2 per cent nickel to prevent chilled sections. The high temperatures secured at the mold give the iron fluidity, thus allowing proper feeding through the risers and permitting the gas to escape.

Colorado Mill Rolled Its First Rails 50 Years Ago

Celebrating the fiftieth anniversary of the rolling of the first steel rails west of the Mississippi River, the Colorado Fuel & Iron Co. has published at Pueblo, Colo., a special edition of the C. F. & I. Blast, a newspaper for employees of the company. The special newspaper is of ambitious size, 16 pages, and its first page is in imitation of the style of newspaper make-up of 50 years ago.

The first rails rolled by the Colorado mill in 1882 were used in the building of the Denver & Rio Grande Railroad through the Royal Gorge. Among the features of the special anniversary edition of the company's newspaper were letters from a number of railroad presidents whose roads have used rails from the Pueblo mill.



TWO photomicrographs, one etched (right) with nital and the other unetched (left), showing the structure of high-strength alloyed electric furnace iron used for clutch plates, brake drums and similar products requiring a wear-resisting iron. The charge consists of molten cupola iron, cold steel scrap and ferroalloys. Each 100 diameters. Detached condition of isolated graphite particles and absence of graphite flakes or stringers are essential to high-strength iron.



Operations in drawing a 6-in. dry cell battery can from zinc.

Specialized Deep Drawing in Zinc—Making a 6-In. Dry Cell Battery Can

By E. H. ARNOLD
Cleveland

ZINC has been considered a very peculiar metal to handle and difficult to deep draw, particularly in its lighter gages, because of its density. Although many stampings have been drawn from zinc, little attention was given for a long time to the possibility of deep drawing the metal. A great deal of thought has been given to this subject and many thousands of dollars have been spent in experimental work in drawing 6-in. dry cell battery cans, with a view of developing methods that would prove superior to those generally employed, especially methods that would insure more accurate can dimensions and lower production costs.

Zinc battery cans are made in several heights and diameters for use in various types of flashlights, and millions of small cans have been manufactured for the B-type battery for radios. In small sizes the cans have been drawn in large quantities. But for a long time it was considered impossible commercially to draw the large cans of a specified height and diameter, starting with a specified thickness of metal and retaining a uniform thickness through the drawing and redrawing operations, without stretching the metal. These larger cans are 6 in. in height and approximately 2½ in. in diameter.

The old method of making these 6-in. battery cans was to roll a suitable blank into a cylindrical form, lap both ends together and then solder the full length of the lap. The bottom pieces were punched out and

DEEP drawing of zinc, a new departure in metal working, is described in this article. Aside from determining the number of operations and the diameter of the blank, much attention must be given to the air pressure, the design and machining of the drawing tools, the construction of the presses and other features if success is to be achieved.

then soldered in one end of the cylindrical shape to form the bottom. However, owing to the increased production of dry cell batteries during the earlier stages of radio development and because of increased demand for use with telephone equipment, special machinery was designed to manufacture and electrically solder these cans. However, while it has been made practical to draw these cans in one piece, assuring a far greater degree of accuracy and eliminating all solder, hundreds of thousands of these cans are still made every year by the old soldering method or the electric soldering process.

The author personally engineered a specialized deep-drawing development for a Cleveland company which had manufactured hundreds of thousands of dry cell batteries. Had the development proved unsuccessful, it probably would have meant a great

loss to the company in the investment required for equipment and for special drawing and redrawing dies.

Before giving an explanation of the number of operations and the general construction of the dies for making these cans in the dimensions previously given and in the specified thickness, which is 0.020 in., the author will tell why this deep drawing work is unusual. One of the most interesting facts in connection with the problems involved in drawing these cans is that at no time during any one of the drawing operations is the metal stretched or damaged. In other words, the metal had a specified initial thickness of 0.020 in. and retained a uniform wall thickness through all the drawing operations.

In proceeding with the development of this zinc can the most important thing to be determined was the series or number of operations that would be necessary. A slip in determining the correct number of draws or series would have been very unpleasant, to say nothing about the cost. The operations are referred to as a series because the operations or redraws have to be performed in unison with each other.

Each operation from the first draw to the last redraw is important from the following standpoint: The displacement or reduction of metal during each drawing operation has to be in such amount or proportion and the reduction so distributed that each reduction can be made from the first draw to the last redraw without any

(Concluded on advertising page 24)

Welding Facilitates Use of Stiffest S

By EVERETT CHAPMAN

Director of Engineering and Research
Lukenweld, Inc., Coatesville, Pa.

Poor engineers using good materials have made structures that would not compare with those produced by good engineers from poor materials, and that are absolutely incomparable with the products of good engineers using good materials. It is obvious that in comparing one structure with another, whether from the point of view of stiffness, vibration, fatigue characteristics, strength, appearance or utility, we must distinguish between two primary elements that determine the characteristics; first, the material of which it is made, and, second, the shape in which the material has been placed by the engineer.

Four common materials used in machine construction are steel, cast iron, aluminum and magnesium. Of the

tool loads are extremely complex. A shape should be used, therefore, that is known to be capable of resisting efficiently loads in every direction and with every conceivable degree of eccentricity. It is significant to note that the choice of every good engineer, namely, a box or tubular section, is available in every conceivable form through use of welding. The most important characteristic of the closed tube or box to the machine tool builder is its high torsional rigidity. These sections possess the greatest amount of torsional strength for the least amount of metal. To the writer, this is the most neglected important subject in machine design.

Torsional distortion is an angular phenomena, and as such may add up to a distressing amount of misalign-

ment, even when the length of a machine is nominal. A great deal of beam strength is not required in machine tools, so that the superior strength of steel does not enter the picture. What is really wanted is beam stiffness and, still more important, torsional stiffness. A pair of ways cocking with respect to each other do not make a workable mechanism if we expect to maintain alignment of the parts which slide on them.

Steel Base Can Be Flimsier Than One of Cast Iron

Let us discuss such a simple thing as a base, on one end of which there is a torque producing unit and on the other end a torque absorbing unit. A cast-iron base, well boxed and ribbed, will possess a very fair and reasonable degree of stiffness. It is conceivable that an engineer can use a stiffer material, such as steel, and make a base which is considerably flimsier than this well boxed cast-iron base. This has been done in many instances—the so-called “picture-frame bases” which have achieved a degree of notoriety as argumentative proof of the flimsiness of steel. While the material of which these picture-frame bases are made is stiffer than cast iron, it has been so shaped, without due regard for the type of loading, that a remarkably inferior base results.

By using steel, however, to build a

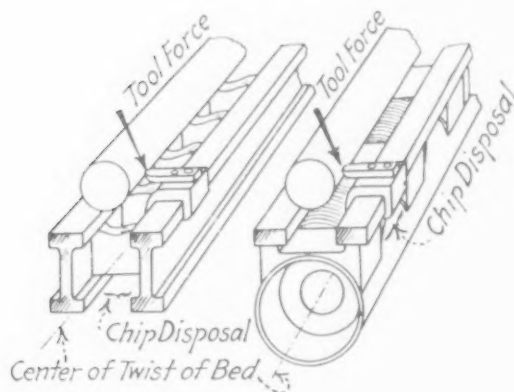


FIG. 1 (below).—Grinder bed 28-ft. long stiffened by use of latticed plates for both torsion and beam action. This freedom of design was made possible by welding.

FIG. 2.—The cast iron lathe bed of conventional design is shown at left, and a possible welded-steel design is shown at right. It is in such changes of design, it is stated, that the economies of welding are to be found, rather than in the geometric substitution of steel for cast iron.

various properties of these materials, machine tool builders are most interested in the modulus of elasticity, which for steel is 30,000,000 lb. per sq. in.; for cast iron 12,000,000 to 15,000,000 lb.; for aluminum 10,000,000 lb. and for magnesium 6,000,000 lb. per sq. in. Using these constants, we get this array: A bar of steel 10 in. long under a stress of 3000 lb. per sq. in. elongates 0.001 in., while a bar of cast iron of the same length and under the same stress elongates 0.0025 in.; the aluminum bar will go 0.003 in. and the magnesium bar, 0.005 in. It is this lengthening or shortening under load that interests us most when discussing machine tool stiffness.

Everything considered, machine



Best Shapes for Machine Tool Loads

box section with an equivalent moment of inertia, we achieve an equal stiffness with considerably less metal, for two reasons: First, the substitution of the steel which is stiffer, and, secondly, it is impossible to cast a completely closed box section because of the cores which must be supported. These core supports will very often rob the section of a considerable amount of important metal. This limitation does not apply to welded structures; a completely closed box can be made with the important metal placed where it will do the most good.

Poor Design Not Corrected by Good Material

In emphasizing this freedom of design, it is worth while to describe a type of plate construction of crane girders which achieves an astonishing amount of torsional rigidity using the same amount of metal as the conventional design but placed in a different manner. An open I or H-section is poor in torsion and yet it is possible with plates in a latticed form to develop a great amount of torsional stiffness even in an open channel. This rigidity increases, of course, when the bottom flange is applied to form the box. The under side of the grinder bed shown in Fig. 1 shows this use of plates in stiffening a 28-ft. bed for both torsion and beam action. An iron bed cast in this form will possess a considerably greater amount of torsional stiffness than the bed cast in the conventional manner. It is merely due to the freedom of engineering design which has been allowed by the process of fabrication that such a latticed construction is possible.

Poor material will not penalize a good design to any great degree. But it is impossible to correct a poor design by the use of a good material. If we face these facts with candor and if each engineer will give thanks for the blessings conferred by the welding process, we shall soon see engineering achievements in the placing and distributing of material that will far outshine many previous accomplishments. But the substitution of steel for cast iron must be accompanied by considerable intelligence.

THE stiffness, and particularly the torsional stiffness, so necessary in machine tools, is provided by completely closed and tubular structural sections; and these can be fabricated in every conceivable form and with the least amount of metal by means of welding. Mr. Chapman illustrates this thesis in connection with the construction of simple bases and lathe beds, and discusses also the important problem of avoiding vibration.

Most troubles with welded steel construction, he indicates, have and will continue to lie in design, rather than in the material or the fabricating process. The latter are often blamed for the poor results, when the trouble really originates in the unintelligent use of the materials and the process. This article is abstracted from Mr. Chapman's paper on "The Machine Tool of the Future: Its Rigidity and Beauty," presented at a recent meeting of the metropolitan and Plainfield (N. J.) sections of the A.S.M.E.

Let us apply this structural philosophy to the elementary case of a lathe bed. Fig. 2 contrasts the usual type of cast-iron bed with a possible welded steel design. It is obvious that in a lathe bed we wish to hold the tool up to the work, first of all to assure accuracy of the finished product and, secondly, to eliminate chattering. The frequency and amplitude with which the tool springs away from the work due to the imposed load and then springs back again by virtue of the consequent load relief is chatter. This phenomenon can conceivably be brought into resonance with some part of the machine. This is vibration.

In a lathe bed, we have to contend with a downward off-angle thrust which does not go through the center of twist of the bed. This makes the bed loading predominantly torsional. The conventional lathe bed design shown on the left-hand side of Fig. 2 consists of cross ribs joining two heavy I-section ways upon which the carriage and tailstock slide. This conventional design if made heavy enough is perfectly satisfactory for most work.

The good engineer's reaction to a torsional load is a tubular section but, because of practical considerations of chip disposal and casting practices, it has been considered expedient to keep the bed open between the two I-sections to permit the chips to fall through. We have thus compromised our engineering with a section which

is not ideally adapted for torsional loading.

If we substitute steel for the cast iron, cross-section for cross-section, placing the material exactly as it was placed before, we will have a lathe bed two and one-half times as stiff as the iron bed. The fallacy in a considerable number of welded designs lies in the attempt to take advantage of this two and one-half factor by thinning the metal sections in this copied structure. Not handling the design constants in the proper manner has inevitably resulted in thinning the metal where it should not have been reduced—and welded steel has another monument.

It is possible to redesign this double I-section bed to give ten times the torsional stiffness we had before in cast iron by using less metal of a higher elastic modulus. Contrast this old design with that on the right-hand side of Fig. 2.

To establish mentally the ideal backbone for the new bed, let us consider the chip disposal problems as secondary. Let us use the most ideal torsional section we know of, a tube. In mounting the ways on this tube we may use short bridge-like members straddling the tube, as illustrated, and between these members we support the ways by inserting arched ribs. The chips can slide over the rounded surface and out through the holes into pans, which solves our secondary problem. Calculations will dictate a rather thin metal section and it will

be necessary to guard against possible secondary stresses by properly diaphragming this tube. Round diaphragms are as good a drumhead as there is, but cutting holes in the center of them will destroy the efficiency as a sounding board.

Many things have been accomplished in shifting from the left-hand design (Fig. 2) to the right by taking full advantage of our two fundamental endowments: stiffer material and engineering freedom. It is in changes of design of this character that the great economies of welded steel are to be found. Merely substituting steel for cast iron, section for section, not only is horribly un-

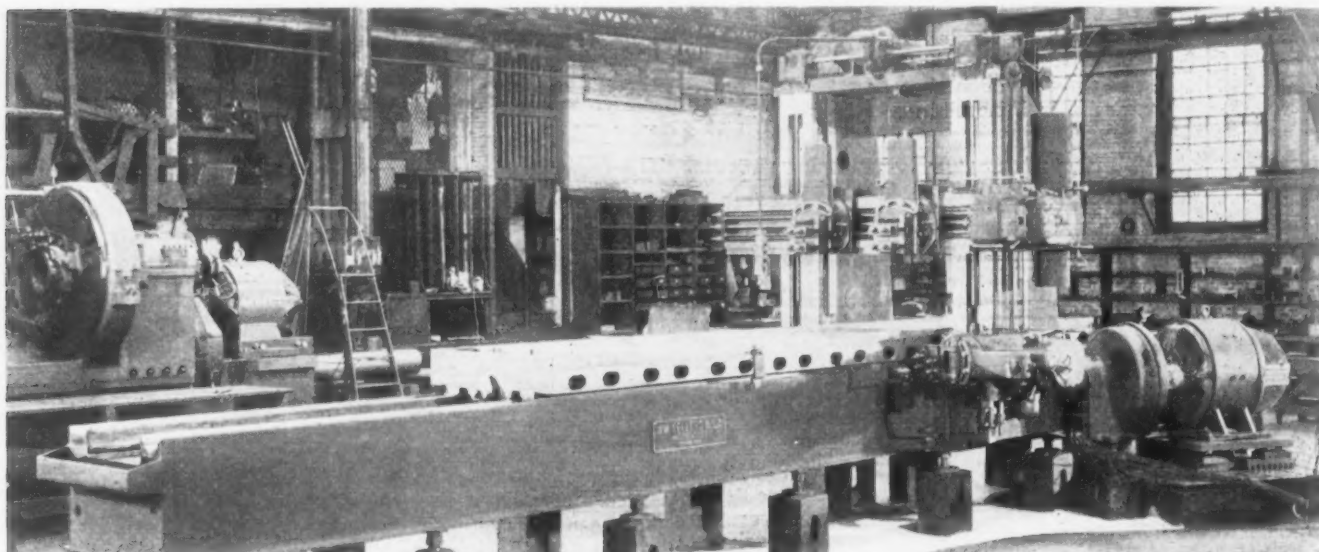
bination with another part has a different natural period; but oscillation at these various frequencies will not occur if nothing excites them.

Sources of Vibration

To excite these vibrations, we must apply a periodic force, one which is constantly recurring at a definite rate. Probably the worst offender of this sort is the following phenomenon: the pressure of the work on the tool causes the lathe bed to spring away from the work whereupon the tool load is lightened and the bed tends to return to its original position, at which the force increases and the bed once more springs away from the

its cost, not in the elimination of natural vibration, which is impossible, but in the scientific avoidance of a union between a natural frequency and a forced vibration. As long as we cannot eliminate the forcing sources of our tools, we can, at least avoid matching them up with those points at which the structure would like to vibrate.

Drum heads need not be deliberately incorporated. This is easy if one knows a drum head when one sees it. The best drum head is round; ribbing or crowning this round head will raise its natural frequency out of the danger range. Triangular unsupported areas are not particularly good



THE bed, table, housings and tiepiece of this 48 x 48-in. 18-ft. planer are made of welded steel. They weigh 34,555 lb., which is some 33 per cent less than the 51,650 lb. of the same parts made from cast iron. A gain in stiffness is also claimed, due not only to the use of stiffer material but to redesign of the various parts to better resist the operating stresses.

economical, but in addition we inherit all the fundamental troubles due to previous compromises with the method of fabrication.

What of the vibrations of the thin sections which are now open to us? Any structure ever made has a natural period of vibration, a frequency at which it will freely vibrate if struck. The period of these natural frequencies of a structure is determined by the product of the mass of the vibrating part and the stiffness associated with that mass. A heavy, chunky structure will vibrate naturally at a low frequency while a light stiff structure has a high natural frequency. The other very pertinent point is that if these natural frequencies are not excited, the structure will not vibrate.

The problem of vibration in machine tools and the attendant chattering is, then, a problem of dealing with the probabilities of exciting one of the natural frequencies of the structure. Many structures have several degrees of freedom, which means that they can vibrate at several different frequencies. One part can vibrate at a certain frequency, this part in com-

work; this is chattering in its worst form and may produce severe vibrations in other parts of the bed. Another source of forcing frequencies in a machine tool structure are poorly cut gears. Gears with backlash, driving a good-sized load through a long shaft, will result in a periodic torsional springing of the shaft. Machine tool builders probably can make a list a foot long of these various exciting influences.

The brute force way of stamping out resulting vibration is to make the piece very heavy with a low natural frequency. The probability of exciting this frequency will be small; if we do, however, we make it still heavier. It is just as feasible and somewhat less costly to make the bed very stiff. This also reduces the probability of natural excitation.

Before the very destructive failures of turbine wheels were definitely stopped, it was necessary to find out at what speeds certain turbine wheels must not be run. Once this was accomplished, failures ceased. It is probable that an equivalent amount of research work would definitely repay the machine tool industry many times

drum heads and the latticed construction incorporates these triangles naturally.

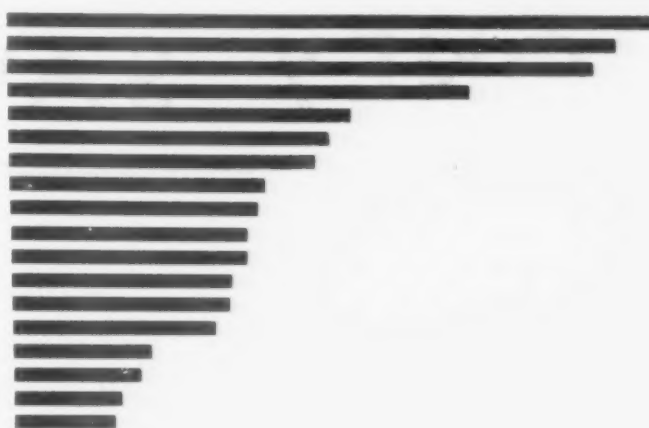
Another important reason for avoiding vibration in any structure is the possibilities of fatigue failure. Vibration stresses, especially those at a resonance point, will impose extremely heavy stresses at an abrupt change in contour. Fatigue failures will terminate the useful life of a machine without warning, and this potentiality is a very costly guest to entertain. Again, it is a matter of proper engineering. As a fatigue resisting material, steel is at least twice as good as cast iron. Any fatigue failures that occur in a redesigned and welded steel structure are squarely up to the man who designed it. He must know considerable about stress distribution, where concentrated stresses occur, he must incorporate gradual changes in contour at points of high bending moment, and last, but by no means the least, he must know the fatigue properties of the parent metal, the weld metal, and the parent metal adjacent the weld, where severe metallurgical damage can take place.

NEW ENGLAND INDUSTRY LOOKS FORWARD

What 109 Metal Manufacturers Select as Profitable Items of Present Day Procedure, as Reported by the New England Council

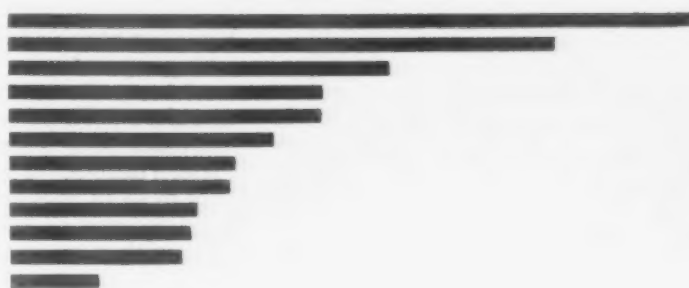
TO IMPROVE PROFITS IN SELLING:

By reducing expenses (other than wages and salaries).....	89
By increasing sales volume.....	83
By producing new products.....	80
By concentrating on most profitable lines.....	63
By applying sales analysis to domestic markets.....	47
By opening more wholesale outlets.....	44
By reducing wages and salaries.....	42
By finding new uses for present products.....	35
By applying market research to domestic markets.....	34
By increased help to dealers or retailers.....	33
By opening more retail outlets.....	33
By concentrating on most profitable sales territories.....	31
By concentrating on most profitable customers.....	30
By revision of selling organization.....	28
By new packaging or wrapping.....	19
By increased advertising.....	18
By applying sales analysis to foreign markets.....	15
By applying market research to foreign markets.....	14



TO IMPROVE PROFITS IN MANUFACTURING:

By decreasing production costs.....	95
By reducing operating costs.....	75
By extending research.....	52
By installing improved high capacity machinery.....	43
By installing new processes.....	43
By revising manufacturing layout.....	36
By application of bonus or wage incentive.....	31
By new management methods.....	30
By use of new materials handling equipment.....	26
By increased safety work.....	25
By improved stores control.....	24
By better factory lighting.....	12



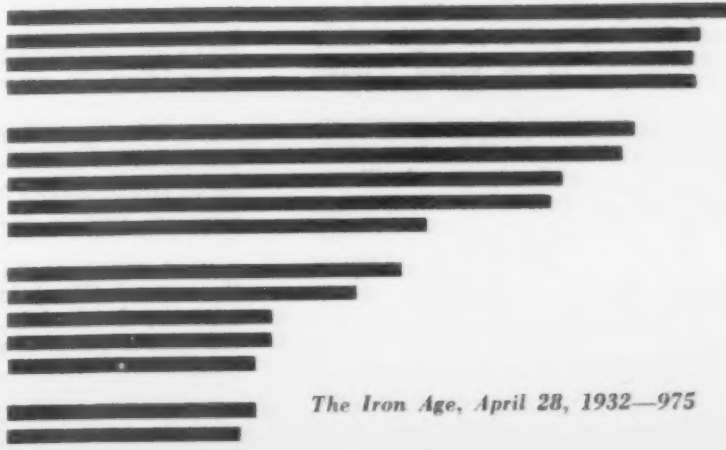
RECOMMENDED PLANS FOR FORESTALLING NEXT DEPRESSION:

By shortening weekly hours.....	85
By vocational guidance away from decadent occupations.....	75
By sales estimating and forecasting.....	71
By employer accepting responsibility for employment of his stable force.....	71
By reserving public works for depression.....	70
By requiring all banks to become Federal Reserve Members.....	70
By budgeting finance.....	60
By budgeting production.....	60
By prohibiting call money loans by corporations.....	59
By restricting bank loans on common stock to actual earning rate or net worth.....	58
By curtailing installment finance companies, etc.....	56
By establishing national mortgage bank.....	53
By reserving plant expansion for depression.....	52
By budgeting sales.....	50
By getting customers to estimate requirements in advance.....	47
By employer setting up payroll reserve for depression.....	45
By giving vendors 3 months advance estimates.....	38
By restricting use of labor saving machinery.....	9
By compulsory State unemployment insurance.....	6
By compulsory Federal unemployment insurance.....	4



GENERAL MEASURES FOR BUSINESS BETTERMENT

Modification of anti-trust laws to stop cut-throat competition.....	100
Modification to permit price stabilization.....	95
Wide use and adoption of scientific management principles.....	94
Broader statistical fact finding service by trade associations.....	94
Standardization of discounts through modification of anti-trust laws.....	86
Long term planning by trade associations.....	84
Moratorium should be extended.....	76
Standardization of reserve accounting.....	74
War debts should be scaled down.....	57
A National Economic Council should be set up by business and Government in cooperation.....	54
Federal government should prevent selling below cost.....	48
War debts should be undisturbed.....	36
Tariffs should be reduced.....	36
Tariffs should be undisturbed.....	34
A National Economic Council should be established by business independent of Government.....	34
Membership in trade associations should be compulsory.....	32



MONEY SAVING IDEAS

— 82 —

Putting Idle Equipment to Work

A COMPANY with several branch plants often is faced with equipment which may be idle in one plant and needed in another. One large company has solved this problem by sending out questionnaires to each plant asking for a list of all surplus equipment and supplies. The answers were tabulated and the items classified. Mimeographed copies were made up in loose-leaf binders and one copy was sent to each plant. The company was surprised by the results. Much usable material was discovered and general interest was aroused to see how the list could be reduced by transferring items from one plant to another. Each plant was instructed to send in word periodically of any items that could be added to the list, the home office acting as a clearing house.

— 83 —

Carbon Steel Plates for Nitriding

SOME manufacturers who have built their own nitriding equipment find that the nitriding box may be satisfactorily made of standard carbon steel plates. One manufacturer, requiring a box about 10 ft. long, 2 ft. wide and 2 ft. high, made it up of $\frac{3}{8}$ in. plates welded into box form and strengthened with angle iron supports. The floor of this box was equipped with pipes to facilitate the circulation of air and a small electric fan was provided to force the air through these pipes along the bottom of the box and to draw in a fresh supply from the top.

976—The Iron Age, April 28, 1932

— 84 —

Tungsten-Carbide Tools Save Metal

A FOUNDRY operated in connection with a machine shop has found a saving in casting costs through the use of tungsten-carbide tools in the finishing operations. These tools machine scale easily and it has therefore been possible to reduce the machining allowance in the pattern design. Where an allowance of $\frac{1}{8}$ in. was used formerly, an allowance of $\frac{1}{16}$ in. is now used with a resultant saving in metal on small castings of 4 or 5 per cent.

— 85 —

Serves Food to Molders

AS a service to its molders, a foundry has introduced a kitchen on wheels. At noontime this kitchen is rolled right in among the molders, and sandwiches, coffee and some hot food is dispensed by a girl in a trim white uniform. Paper containers are provided, designed to suit the needs of the not-too-well-washed-up men. After a little initial reluctance, the molders have become enthusiastic about this innovation. They say it saves time.

— 86 —

Grinds Welded Joints

STEEL furniture fabricated by welding is smoothed down rapidly with grinding wheels in a small but growing plant. The pieces to be finished are picked up by the operator, one at a time, and the welded joint is moved back and forth across the face of a 10 in. wheel on a motor driven floor stand. The joints of a chair seat are finished in this way at the rate of forty in an hour.

— 87 —

Plans Shop for Two Shifts

THE equipment necessary for making complicated dies in a stamping plant is elaborate and expensive and in order to cut down on this expense, one manufacturer has installed only such equipment as is necessary to produce his normal run of dies on two shift operation. He finds there are wide variations in the demand for dies and that even at times such as the present the die demand occasionally runs to peaks considerably above the average. When such is the case he buys dies from diemakers outside the plant to carry him over the peaks. For an active but lesser demand he operates two shifts. The result is that during relatively quiet periods his die shop is running to capacity on an efficient basis on one full shift.

— 88 —

Slitter Cuts Square

THE usual practice in a stamping department handling large products but turning occasionally to small items is to split wide steel strips into narrow strips for the small work. When the amount of small work is meager, the narrow strips are sometimes cut on shears, but when it reaches heavier proportions a gang slitter is used. The superintendent has recently remodeled this slitter so as to square the strips and cut them to desired lengths all in one stroke and in this way he has cut out an intermediate operation with resultant economy.

AS FOR THE WORKS MANAGER

— 89 —

Special Shaped Bars Lower Costs

THE use of bars rolled to special shapes often reduces manufacturing costs. A maker of small tools has been able to introduce wedge-shaped bars into the production of certain knives with a resultant saving in labor of about 15 per cent and with an increased cost for material amounting to less than 5 per cent. An axe manufacturer buys a double wedge-shaped bar of high carbon crucible steel for forging the axe bits. After forming, these bits are welded to the poll pieces.

— 90 —

Steel Sheets on Flat Cars

A LARGE user of sheets has cooperated with his supplying steel mill to reduce shipping expense. Under the new arrangement the sheets are shipped on open flat cars thus taking a lower rate than with the usual box car. The sheets are loaded in piles and shored with timbers and are adequately protected against weather with layers of waterproof cloth and paper. The flat cars enter the plant on a standard gage track which extends for several hundred feet along the side of the receiving platform. This platform is served by overhead cranes equipped with special buckets which have long, slender fingers. The method of handling the sheets both at the mill and at the user's plant has been standardized. It can be readily understood that it would be difficult to pick up part of a compact pile of sheets with a bucket, whatever its design,

without injuring the edges of some of the sheets. This difficulty is overcome by inserting at intervals in the pile, spacers of sufficient width to permit the entrance of the bucket fingers. Inasmuch as the equipment is similar at the mill and at the plant the spacers can be arranged always to give a good full working load.

— 91 —

Adapts Design to Heat Treatment

MOST manufacturers are still reluctant to adopt heat treatment as a definite link in the manufacturing sequence just as grinding or machining processes are established as definite links. For many other processes the design of the machine part itself is frequently altered to promote more efficient fabrication. Thus a forging is sometimes redesigned to cut the cost of forging dies. In a similar way one company has redesigned many parts for greater efficiency through the heat treating cycle. Dies for drawing wire, for rolling threads and for punching small complicated parts have been drilled with holes back of the working surfaces to permit more rapid and more uniform heating and quenching during heat treatment. On larger work this company has at times divided a die into several parts for heat treatment because of greater success with such smaller units. After heat treatment the parts are bolted together to form the complete die. Doubtless many other methods of increasing heat treating efficiency will develop as soon as the value of heat treatment as a manufacturing process becomes more widely established.

— 92 —

Fire Tongs in One Piece

AFTER some initial difficulties a malleable iron foundry has succeeded in casting fire tongs complete in one piece. The entire casting from tip to hinge and back to tip is about 6 ft. long. Two of the tongs are cast in one flask. Metal is first poured in a long runner parallel to the casting and is distributed from this through eight small flat gates. Half of the casting is molded in the drag and half in the cope.

— 93 —

Oil Wash for Deep Draws

AN oil wash following the pickling of steel plates often helps the action of the dies during subsequent deep drawing operations. Such a wash, which is relatively inexpensive, appreciably increases the life of dies and in some cases makes difficult deep drawing possible. One plant uses a solution of 40 per cent soluble oil and 60 per cent water. This also protects the plates against corrosion if they are held in stock before working.

— 94 —

Moisture Control Pays

THE dollars and cents value of moisture control for foundry sand is often overlooked. One foundry has installed an automatic humidity indicator at considerable expense, but reports a saving per month of more than 10 per cent of the cost of the equipment. The moisture content of the sand as it passes on a belt conveyor is held to within a quarter of one per cent of the specified value, which is 3 per cent by weight.

Develops Small Internal Grinder for Rapid and Accurate Production

THE Heald Machine Co., Worcester, Mass., has brought out an entirely new internal grinder designed especially for grinding small work. Compactness, ease of operation, high speed and other features make for high production, especially where close accuracy is required.

Except for starting, loading and unloading the work, operation is fully automatic. The machine can be arranged to size the work by means of the Size-Matic or the Gage-Matic methods similar to those used on the company's No. 72 internals, or by a combination of both devices. All machines can be operated as plain grinders.

The general functions of the new grinder, designated as the No. 81, are similar to those of the No. 72 machines, but there is one distinct difference: the workhead and work rather than the wheelhead and wheel reciprocate with the main table. For a small machine, it is held that this arrangement has important advantages. It permits the entire grinder to be driven by one standard single-end motor. It gives the most rigid support for the wheelhead, and permits the high speeds necessary in grinding small holes. Also, the cross-slide and control box is in a fixed relationship to each other, permitting

THE operating cycle is automatic. Sizing may be by the Size-Matic or the Gage-Matic methods, or by a combination of both.

the use of mechanical control for sizing, thus eliminating the necessity for any electrical connections.

Particular attention has been given to a complete guarding and inclosing of units, mechanism and belts.

Hole Size Tested at Every Stroke of Wheel

Where the work consists mainly of straight, open holes and production and accuracy are required, the machine arranged to size "Gage-Matically" is recommended. In this method two solid positive gages function at the back of the hole and at every stroke of the wheel automatically test the hole for size.

The cycle of operations is as follows: The work travels at high speed until it approaches the wheel when it slows down to roughing speed

with the wheel cutting at the roughing feed. Each time the wheel recedes from the hole, the roughing gage attempts to enter; when the hole is nearly to finished size, the roughing gage enters, the work moves away from the wheel, the diamond drops into position and the wheel is trued at truing speed. The wheel then starts to grind again, the speed having been changed to finishing speed and the feed to finishing feed. When the hole has reached finish size, the second gage enters the hole, and the work withdraws automatically from the wheel at high speed and all units go to rest position.

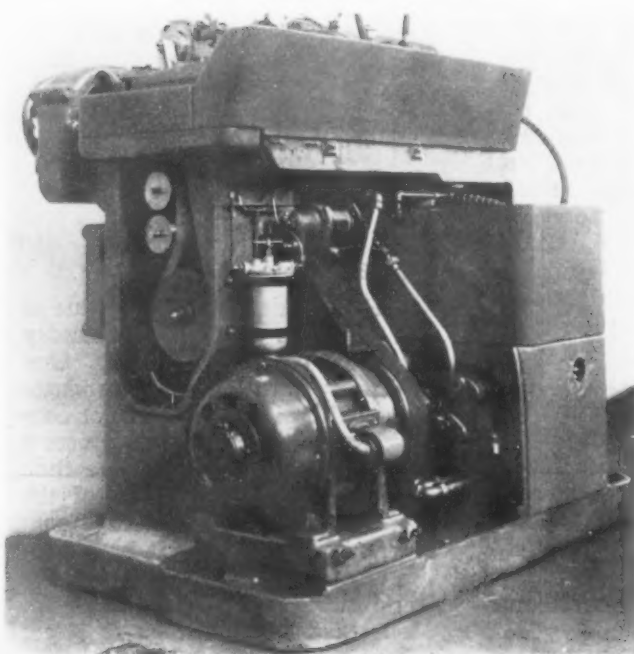
For miscellaneous, blind or taper work the machine is arranged to size "Size-Matically." In this method there are no connections with the work, the sizing being controlled by the cross-slide and wheel truing unit. The diamond is set to true the wheel at a definite relationship to the finish size of hole; having done so, grinding with a set number of passes with definite advancement of the cross-slide brings the work to exactly finish size. Wear of the wheel is taken care of by compensation on the cross-slide.

Compact Base Has Walls $\frac{3}{4}$ -In. Thick

The base of the machine is a one-piece box-type ribbed iron casting having walls $\frac{3}{4}$ in. thick and weighing about 1450 lb. It rests on a three-point bearing. The base contains the oil reservoir; its lower part is extended at the rear to increase the rigidity and to provide a solid mounting for the driving motor and oil and water tanks.

Tailways, one flat and one vee, are protected from grit and dirt at all positions of the table. They are lubricated by gravity feed from a reservoir located in the right-hand rear corner of the water pan, an arrangement that maintains the oil at a constant head. The oil is filtered.

The table is driven by a simplified



REAR view with covers removed to show the location of the motor and the improved geared pump for the hydraulic system, which is coupled directly to the motor. Only two pipes extend to the hydraulic control box.



hydraulic system operated by oil under constant pressure. A new design of geared oil pump running on larger roller bearings is employed; it is connected to the motor by flexible coupling and supplies oil from the tank in the base to the valves in the control box as well as to the cylinder in the wheel truing device. The reverse valve and cylinder which drive the table are one unit, simplifying the piping very materially.

Table controls are centralized within a small radius at the front of the machine. Five table dogs are used on the No. 81 Gage-Matic and four on the Size-Matic. Every function of either machine which is controlled by the dogs is adjustable separately.

The workhead is mounted on a swivel circle on the table. The spindle, carried on preloaded ball bearings, is equipped with a 6-in. diameter flange which assists materially in lining up chucks and fixtures. On the standard size Size-Matic, the workhead can be swiveled for taper work up to 30 deg. included angle. Although the workhead spindle starts and stops automatically, it can be controlled by a hand lever that engages a cone clutch with a single disk type brake. The workhead spindle may be revolved freely while setting-up.

Work Guarded for Splash of Coolant

The chuck waterguard is unusually free from leakage and splashing. It comprises two sections, the rear one of which is bolted to a milled surface on the workhead casting. The two sections can be adjusted to accommodate different lengths of fixtures. Water can be supplied either through the workhead spindle, from the front of the chuck water guard or from the wheelhead.

Of simple yoke and lever construction, the fixture-operating mechanism is controlled by a light pressure on the operating lever. Pressure is obtained by a set of nine springs; extra springs can be fitted inside the standard ones for heavier pressures, or some of the standard springs can be removed if lighter pressures are wanted.

The cross-slide is mounted on a bridge as shown, and slides on generous bearing surfaces. The screw is arranged with spring take-up for backlash. The cross-slide is arranged to give coarse wheel feed for rough grinding and at a predetermined point to change to fine feed. With standard gears the maximum feed is 0.00102 in. and the minimum 0.00017 in. on the diameter of the work.

Feed mechanism is inclosed and runs in oil. It is of improved design whereby the feed pawl does not ride back over the ratchet teeth on its return stroke. The pawl works under very light pressure, and is provided with nine teeth so that when one tooth becomes worn it can be turned and another tooth brought to bear on the ratchet wheel. The cross-slide dial can be moved by hand from out-



COMPACTNESS is a feature, as well as the complete inclosing of all units, mechanisms and belts. Guards that must be removed are held with springs and can be taken off without tools.



side the fuel box to aid in setting up the wheel.

Cross-Slide Arranged to Compensate for Wheel Wear

The cross-slide is arranged to compensate for wheel wear and assure that a slight amount of stock will be trued from the wheel each time the diamond is dropped into position. On the Gage-Matic this is a slip ring which permits the fine feed to continue until the finishing gage enters the hole. On the Size-Matic, compensation is by means of a pawl which slips by a predetermined number of teeth on the ratchet wheel as the handwheel is backed off before starting the grinding cycle. The amount of compensation is adjusted by a knob in a slot on the back of the feed box. Exceptionally close regulation of wheel wear is possible; on small work this is very essential.

The wheel truing device trues the wheel just before the finishing cut is taken. It is a rigid, self-contained unit and is bolted on to a scraped pad on the main table. The diamond is dropped into position hydraulically and raised by a cam on the cross-slide. It swings on shielded-type ball bearings and is easily adjusted for position. Although automatic, this truing device can be operated by hand when desired. The construction permits in and out movement of the diamond without changing the height of the diamond point. This important new feature is especially desirable for small wheels.

The wheelheads used on this machine are built especially for high speed, the smallest size spindle running at 42,000 r.p.m. The different types are so graduated that a single size pulley can be fitted to the

wheelheads of each type. A single length of wheelhead belt is suitable for almost all sizes of pulleys, as the difference in required length is taken care of by the ball-bearing idlers in the base.

A single-end 5 or 7½-hp. 1800-r.p.m. N.E.M.A. frame motor mounted as shown is employed to drive the machine.

Specifications of the machine include: Swing over table, 13½ in.; swing inside standard water guard, 7½ in.; maximum length of hole that can be ground, 2 in.; and maximum diameter of hole, 1 in., but actually limited by capacity of fixture. On the standard machine workhead speeds range from 900-1650 r.p.m., and table speeds are unlimited between 0 and 40 ft. per min. Table travel is 11 in. Total floor of 42x55 in. is required and the machine weighs 3200 lb. net.

High-Speed Air Grinder Employs Cone Wheels

EQUIPPED with cone wheels and operating at 10,000 r.p.m., the new No. 255-X Thor rotary air grinder recently brought out by the Independent Pneumatic Tool Co., 600 West Jackson Boulevard, Chicago, is adapted for cleaning and grinding of a wide variety of castings and forgings. It will operate cone wheels 2¼ in. in diameter. The driving collar is provided with a right-hand thread so that cone wheels now on hand in the shop or foundry may be used on this machine. The grinder weighs 8¾ lb. and is 19¼ in. long.



New Spiral Bevel Gear Generator Operates at Higher Feeds and Speeds

IMPROVEMENTS that make for greater rigidity and enable operation at higher feeds and speeds feature the No. 16 spiral bevel gear generator which is being brought out by the Gleason Works, Rochester, N. Y.

The machine is of completely new design and replaces the Gleason 15-in. spiral bevel gear generator. It has an improved type of cutter cradle, new reversing and indexing mechanisms which are free from vibration and noise, and straight line movement of the work into the cutter. Liberal use is made of anti-friction bearings.

The three major parts of the machine are the frame, workhead and cutter cradle. The frame is a heavy one-piece casting. The cutter cradle is entirely contained in a full circular housing bolted to the frame. The workhead is bolted to a large sliding carriage which moves at right angles to the root line of the gear being cut.

For quantity production, it is recommended that both gears and pinions be roughed on Gleason spiral bevel roughers and the No. 16 generator used for finishing only. New style roughers have been developed and the cost of roughing gears in quantities on these machines is considerably less than that of roughing them on a generator or on the old style roughers.

If the quantity of gears to be cut is not sufficient to warrant the use of roughers, however, gears and pinions can be both roughed and finished on this machine. No special equipment is required for roughing pinions, but a double track feed cam, furnished as extra, is necessary if gears are to be

roughed. To change from the roughing to the finishing positions on this cam it is only necessary to turn a crank which shifts the cam roller.

In operation the work is fed into the cutter to cut a tooth space of the blank, then withdrawn, and the work indexed for cutting the next tooth space. As the cutter rotates with the blank to produce the lengthwise tooth shape, a relative rolling generating movement is produced simultaneously between the cutter and blank to generate the correct tooth profile. This rolling motion consists of a slow rotation of the cradle which carries the cutter in timed relation to a corresponding rotation of the work spindle, and corresponds to the motion of a gear rolling with a crown gear of which the cutter represents a tooth. This succession of operations continues until the last tooth is cut, when the automatic stop acts to stop the machine and prevents recutting a tooth. After the work is mounted on the spindle, operation of the machine is completely automatic.

Work is moved into and away from the cutter by the feed cam. This cam runs in a bath of oil which supplies cam ways and rollers with lubricant.

The generating motion, number of teeth to be cut and the feed and speed of the cutter are controlled by conveniently located change gears.

Straight-Line Movement of Work

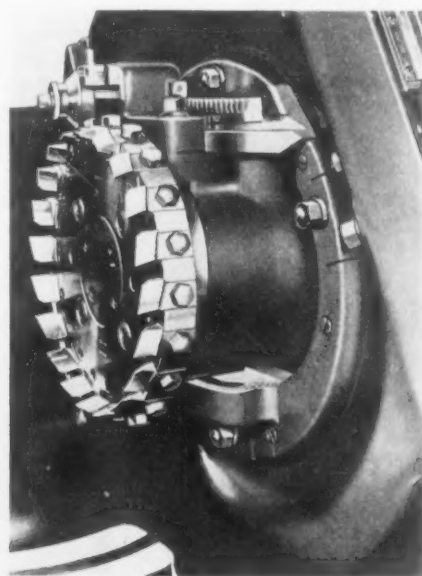
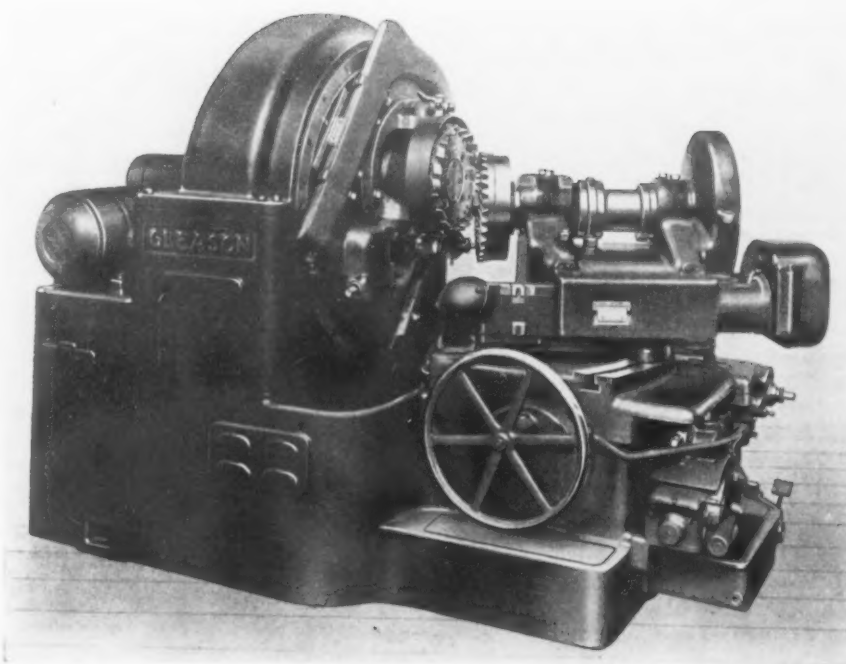
The workhead carriage is held in close alignment by large adjustable gibs. The straight-line movement of the work, a new feature of this type of generator, is an advantage, since

the work may be moved more rapidly into and away from the cutter, thereby reducing materially the time required for indexing. A large hand-wheel is provided to move the entire unit for chucking or removing the work or for inspecting the first tooth for size and finish.

The work spindle is of large diameter, giving greater bearing area and at the same time allowing a choice of bore sizes to accommodate large pinion shanks. Its design has been improved to permit mounting the work near the spindle bearings, greatly reducing the overhang between gear blank and bearing.

Main support of the cutter cradle is furnished by the circular housing bolted to the frame. Of full circular type, the cradle is held with the same rigidity in all positions of the generating roll. The drive to the cutter spindle is positive, with no sliding shafts. Adjustments are provided for setting the cutter for the spiral angle of the gear to be cut and for taking up cutter wear. In addition, the cutter is adjustable angularly in two different planes; the latter provide a means of altering the tooth bearing as desired and make possible use of one cutter for a variety of jobs.

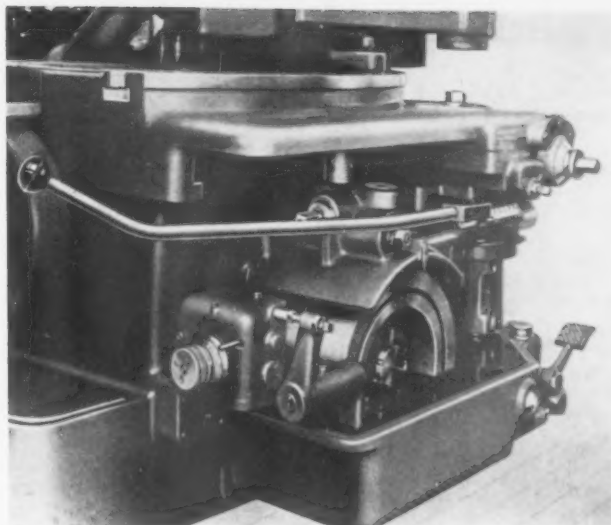
A 42-in. 300-tooth dividing wheel controls the generating motion of the cutter cradle. It is of split-type and to assure accuracy it is hobbled in place. It is first rough hobbled in the usual manner, then several light finishing cuts are taken, the two parts



THE cutter cradle is of improved type, and new reversing and indexing mechanisms, which operate without vibration or noise, are employed. The cutter and cutter spindle mounting are shown in view above.



WORK is moved into and away from the cutter by the feed cam, which runs in a bath of oil. This view shows the cam, the automatic stop and the work-head clamping handle.



being shifted until the required accuracy is obtained.

Cutter Spindle Mounted on Preloaded Bearings

The cutter spindle is mounted on matched preloaded bearings to eliminate radial and axial deflection. Direction of rotation of the cutter spindle is easily changed for the opposite hand of cutter by means of a clutch controlled by a lever. To insure concentricity, the nose of the spindle is ground with the spindle mounted on its own housing.

Indexing and reversing mechanisms are accessibly located and are provided with hydraulic dampeners to enable them to operate smoothly even at high speeds. Reversing as well as indexing operations are effected without noise or vibration.

The number of teeth to be cut is controlled by index change gears constantly in motion as they function in the generating train. This arrangement provides a large final reduction which gives accurate control of the generating motion. A large index wheel controls the work during the indexing and cutting operations. This wheel is of the split type and is hobbled in place.

Most of the machine is lubricated automatically. Parts not supplied by the automatic system are lubricated with a manually operated plunger system. Both systems are equipped with filters. The coolant pump has a capacity of 5 gal. per min. Both cutting and lubricating oil pumps are of the geared type. A generous size chip pocket is provided in the machine frame, where the chips are drained of coolant.

When starting the machine, the main drive motor will not operate until the pumps have built up sufficient pressure to supply coolant to the cutter and to lubricate the entire machine. Should the oil supply become low, the same mechanism will stop the machine. This does not prevent jogging the machine when set-

ting-up, as an across-the-line switch is provided for this purpose.

The machine is driven by a compact Gleason coupled spiral bevel motor drive. An N.E.M.A. 3-hp., 1800 (or 1500) r.p.m. motor is required for the

drive; a $\frac{3}{4}$ -hp. motor is used for the lubricating and cutting oil pumps. A magnetic controller and push-button with stop, start and jog positions are used for the main drive. An overload relay protects the machine from damage should the cutter become overloaded. All of electrical equipment, except a portable switch button, is built into the machine.

Capacity specifications are as follows: Longest cone distance, 30-deg. spiral angle 12-in. cutter, 9 in.; largest and smallest pitch angle, shafts at 90 deg. are 82 deg. 53 min. and 7 deg. and 7 min. respectively; and extreme ratio, shafts at 90 deg., 8 to 1. The largest pitch diameters are: 8 to 1 ratio gear, 18 in.; 2 to 1 ratio gear, 16 in.; and 1 to 1 ratio, 12 $\frac{1}{4}$ in. The largest pitch, Gleason system, is 2 $\frac{1}{2}$ D.P. The maximum full depth is $\frac{3}{4}$ in. and the longest face is 1 $\frac{1}{4}$ in.

Feeds, in time per tooth, range from 12 to 73 sec. Cutter speeds, in ft. per min., are: 6-in. cutter, 64 to 220; 9-in. cutter, 67 to 236; and 12-in. cutter, 73 to 228 ft. per min. Floor space of 71 x 104 in. is required. The machine weighs about 11,500 lb.

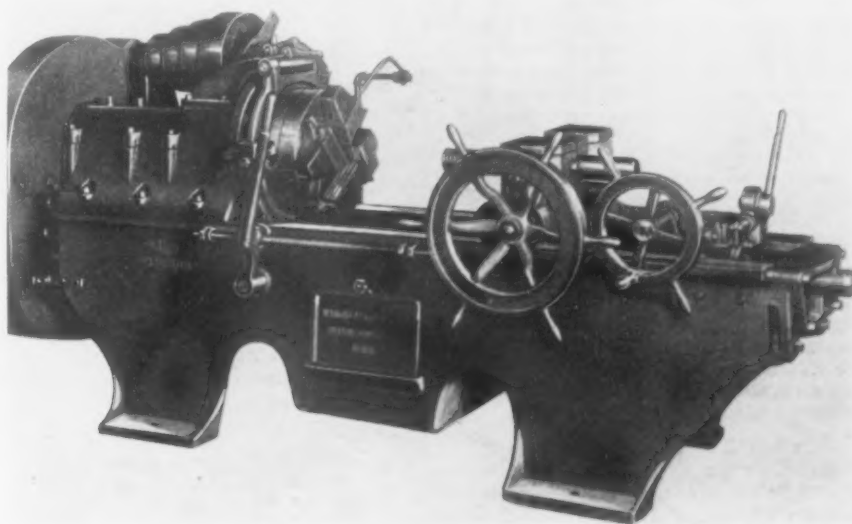
Die Head with Roughing and Finishing Device

FOR use on its 4-in. leadscrew threading machine, the Landis Machine Co., Waynesboro, Pa., has developed a new rotary die head equipped with a roughing and finishing attachment. This die head can be used for cutting single, double, triple and quadruple threads ranging from $\frac{3}{4}$ to 4 in. in diameter with a maximum lead of $\frac{1}{2}$ in., and is recommended for cutting coarse pitch threads on valve stems, vise screws, etc., which require close accuracy and unusually fine finish.

The roughing and finishing cuts

are controlled by a latch mounted on the yoke bracket. Release of the latch, after the roughing cut is made, permits the die head to close for a light finishing cut. The amount of metal removed during this cut is approximately 0.045 in.

No cutting strains are transmitted either to the die head yoke or the roughing and finishing attachment. The die head is locked within itself when set for either the roughing or finishing cut, thus making it possible to produce threads that are free from taper and uniformly accurate for size. A pitch indicator is employed to assist the operator in timing the engagement of the leadscrew nut for the finishing cut.



The new rotary die head developed for this machine is equipped with a roughing and finishing attachment.

British Increase Duties on Steel and Machinery

Shutting Off of Cheap Semi-Finished Steel from Continent May Restrict English Exports

WASHINGTON, April 26.—The effect of the increased British tariff duties on American exports of iron and steel and metal-working machinery to the United Kingdom will be watched with considerable interest. Inasmuch as the higher rates did not become operative until today it will manifestly be some time before the result will be apparent. It is the general assumption that the new duties will act as a check on movements from the United States. At the same time it is held to be clear that the boosting of the duties is directed principally at Continental Europe so far as metal-working machinery and iron and steel are concerned. This is held to be particularly true of iron and steel which, it is contended, has been dumped into England for several years by European countries, chiefly Germany, Belgium, Luxemburg and France. To a somewhat less degree, Germany is understood to have been exporting machinery into England at prices which English makers could not meet.

The sharpest increase is in the duties on iron and steel. They were raised from 10 to 33½ per cent, and have been established for a period of three months, during which they will be given further investigation. The duty on machinery was increased from 10 to 20 per cent. Unlike the French system, the English tariff readjustment is not discriminatory. It applies alike to all countries, except for the usual preferences to British colonies.

In fixing the duty of 33½ per cent on iron and steel, the British Government's Import Duties Advisory Committee listed the following products:

Spiegeleisen and ferromanganese, iron and steel other than pig iron, but including alloy steel of the following descriptions: (a) ingots other than those manufactured entirely from pig iron smelted with charcoal; (b) blooms, billets and slabs other than wrought iron produced by puddling with charcoal from pig iron smelted wholly with charcoal; (c) sheet and tin plate bars; (d) bars, rods, angles, shapes and sections of all kinds, whether fabricated or not; (e) forgings, including drop forgings in the rough or machined; (f) castings in the rough or machined, weighing a hundredweight or over; (g) horseshoes; (h) girders, beams, joists and pillars, whether fabricated or not; (i) hoop and strip of all kinds; (j) plates and sheets of all kinds.

Roller and ball bearings are also included under the 33½ per cent rate of duty. Tubular products and rolling stock remain at 20 per cent.

Machinery not now obtainable in Great Britain is exempted from the

20 per cent duty, but all other kinds, except agricultural, are included. Agricultural machinery was given a duty of 15 per cent. Since in different countries the clause exempting products not produced in the countries fixing the rates has been found difficult of administration, it is a question as to how the British exemption provision will work out. It might prove important to the United States which exports large quantities of special machinery.

Sizeable Exports to Britain

While exports of iron and steel products to the United Kingdom do not represent a relatively large volume, they are sizeable and cover a wide range. In 1930 exports of iron and steel to the United Kingdom totaled 45,033 gross tons, valued at \$10,799,000. In 1931 they amounted to 40,476 tons. Among the more important shipments in tons in 1930 were: Steel bars, 15,173; welded black steel pipe, 6723; black steel sheets, 2439; black iron sheets, 2107; plain wire, 2444; hoops and bands, 1509; wire rods, 784; boiler tubes, 775; woven wire fencing, 725, and cold-rolled strip steel, 490.

Exports to the United Kingdom in 1931 showed a sharp spurt the latter part of the year, except in December, shipments having been hurried abroad duty free in anticipation of the fixing of the general duty of 10 per cent. Among the principal products exported last year, in gross tons, were: Steel bars, 12,500; black steel sheets, 5232; welded galvanized steel pipe, 2872; scrap, 1947; cold-rolled strip steel, 1549; hoops and bands, 1280; wire nails, 1087; galvanized wire, 1076. Imports from the United Kingdom last year were 20,233 tons, or 50 per cent of exports from the United States to that country. Imports from the United Kingdom consist chiefly of such products as ferromanganese, pig iron, steel bars, shapes, round iron and steel wire and hoops and bands.

Exports of industrial machinery to the United Kingdom, by values, were: 1929, \$26,538,061; 1930, \$22,152,652, and 1931, \$19,911,767. They consisted of all kinds of equipment in this classification, such as metal-working machinery, construction machinery and textile machinery.

The additional British duties do not reflect the actual extent of tariff protection given. Protection was automatically set up when Great Britain went off the gold standard. Since the pound sterling has depreciated about 30 per cent, that factor may be added

to the outright protective tariff duties applying to countries still on the gold standard, such as the United States, Germany and France. Hence, assuming a machine were exported to Great Britain last July duty free at £100, it would today represent a duty paid value of £156 by allowing an additional £30 for sterling depreciation plus a duty of 20 per cent.

The maximum duty set on iron and steel imports by the United Kingdom has created a great deal of speculation. It is well known that in the latter part of 1931 England imported more iron and steel than she exported. The heaviest imports came from Continental European countries and the largest part of them were semi-finished material, such as slabs, billers, blooms and sheet and tin plate bars. It is claimed that not only were these shipments made at prices which English manufacturers could not meet, but were below the cost of production in Continental Europe. Billets selling at \$10.85 per ton, Channel ports, it is stated, are below the cost of production. It was with a view to curbing this movement, it is said, that England imposed the rate of 33½ per cent, in the hope of building up British industry.

"Transformer" Mills Will Be Affected

The question now has been raised as to where the Continental European mills, especially semi-finished steel equipment, will turn for an outlet. Also the question has been raised as to what effect will the checking of this class of imports have on British "transformer" or "rerolling" mills. They have been rolling much Continental semi-finished tonnage, but apparently will be jeopardized, while complete British units, from steel works to finishing mills, will be stimulated. The United States has no counterpart of the British "transformer" mills. There even has been some speculation as to whether Continental semi-finished mills, restricted in the British market, will seek to dispose of tonnages to the United States. Such a move apparently would be futile, since the only outlets would be competing American mills which roll their own steel. The anti-dumping act would be an important obstacle.

Another source of speculation relates to the effect of the tariff on British export trade. Plain and galvanized sheets and tin plate constitute an important part of British finished steel exports. This has been due in an important degree to the fact that British foreign trade has been built around cheap sheet bars and tin plate bars imported from Continental Europe. If this import movement is greatly restricted by reason of the new duty, the British mills apparently will be in a less favorable position for exporting because of higher costs. It is believed that these costs will come much nearer to American costs and therefore place American mills nearer a parity with British mills in reaching export markets.

Unemployment Benefits Favored by National Metal Trades

Association Considers Plans But Opposes Federal or State
Compulsory Laws—Problems of Depression Discussed

IN its thirty-fourth annual meeting, held on Wednesday, April 20, at the Hotel Commodore, New York, the National Metal Trades Association devoted its attention largely to a discussion of the problems that have arisen out of the depression. A number of the speakers warned against the continuance of extravagant governmental expenditures and cautioned manufacturers to be on guard against drastic regulatory and social legislation that is likely to be an aftermath of the depression.

One of the most imminent results of the depression in new legislation is compulsory unemployment insurance. Although Wisconsin is the only State thus far to adopt such a law, it was pointed out that similar legislation in other States is likely within the next year. To offset such legislation, the National Metal Trades Association suggests that its members and other manufacturers give careful thought to the voluntary adoption of unemployment benefit plans.

The association has recently made a thorough study of the subject, which has been published in pamphlet form. The committee in charge of this investigation consists of G. E. Randles, Foote-Burt Co., Cleveland, chairman; Dr. Otto P. Geier, Cincinnati Milling Machine Co., Cincinnati, and H. A. Sedgwick, Cutler-Hammer, Inc., Milwaukee. The research work was done largely by W. E. Odom, director of the association's department of industrial relations, who is continuing the study with a view to determining the most successful plan.

It was pointed out at the meeting that manufacturers generally probably will be called upon to put some plan into effect, and the association's purpose is to try to find the formula that will be most successful in the long run both for employers and employees.

Wisconsin Manufacturers Adopting Plans to Comply with Law

C. W. Clausen, president, J. I. Case Co., Racine, Wis., said that Wisconsin manufacturers have until June, 1933, to put into effect a plan that will meet with the approval of the Wisconsin State Industrial Commission. The Case company has adopted a plan of its own. Mr. Clausen said that had this plan been in operation during the 10 years preceding the depression there would have been a fund of \$4,000,000 available for Case employees, and this amount would presumably

have tided them over the depression period.

There is a call for a distinctly "American plan," which will avoid the pitfalls of the systems that have been introduced in European countries. The report of the association's committee on this subject and the comments of speakers at the meeting emphasized the desirability of taking action that would forestall the general adoption of Federal and State unemployment insurance, which was declared to be "unsound."

"Until the necessary experience and statistical data are accumulated," the committee's report stated, "the only plans for the creation of unemployment benefit reserve funds which our association could recommend to its members are those based upon systematic savings on the part of employees, with or without contributions from the employer, which are not pooled with other funds, and under which the benefits payable are in proportion to the individual's accumulated savings."

Warns Against Letting Down in Apprenticeship Training

In his address to the convention, J. G. Benedict, Landis Machine Co., Waynesboro, Pa., who has served the association as president during the past year, called attention to the letting down in the training of apprentices during the depression period. "The time is coming in this country," he said, "when there is going to be a shortage of skilled help. If we all permit ourselves to become shortsighted and let our apprenticeship programs and our training activities deteriorate, there is no doubt in my mind that three or four years from now we will again be bidding against each other for the services of an adequate supply of skilled workmen."

Jacob D. Cox New President

Jacob D. Cox, Jr., Cleveland Twist Drill Co., Cleveland, succeeded Mr. Benedict as president. Other officers and councillors elected are as follows: First vice-president, Alexander Sellers, William Sellers & Co., Philadelphia; second vice-president, Charles H. Strawbridge, Goodman Mfg. Co., Chicago; treasurer, John W. O'Leary, Arthur J. O'Leary & Son Co., Chicago; councillors for two years—J. G. Benedict, Landis Machine Co., Waynesboro, Pa.; E. C. Bayerlein, Nordberg Mfg. Co., Milwaukee; Harold Edwards, O. M. Edwards Co., Inc., Syra-



JACOB D. COX, JR.
New President of Na-
tional Metal Trades As-
sociation

cuse, N. Y.; M. W. Pickering, Farrel-Birmingham Co., Inc., Ansonia, Conn.; Arthur H. Starrett, L. S. Starrett Co., Athol, Mass.; A. H. Timmerman, Wagner Electric Co., St. Louis; councillor to fill unexpired term, W. D. Hamerstadt, Rockwood Mfg. Co., Indianapolis.

The association confined its 1932 meeting to one all-day session, concluding with a banquet in the evening. The program included an unusual array of speakers, including Col. Robert R. McCormick, publisher, Chicago *Tribune*, and Representative James M. Beck of Pennsylvania. The latter addressed the banquet. Colonel McCormick's address at the afternoon session was broadcast by station WOR.

Representative Beck blamed the growth of Federal Government expenditures on the "agricultural bloc" in Congress. He cited figures to show that the States represented by this bloc have been receiving from the public treasury a great deal more money than they put into it, the burden being forced upon the few industrial States which pay the largest amounts in taxes.

Declares Depression Was Caused by Governmental Extravagance

Colonel McCormick said that "the cause of the world-wide depression has been definitely and finally traced to the extravagance of governmental expenditures since the war." Denouncing this extravagance and the "confiscatory" taxation which is following in its wake, Colonel McCormick declared that "we have reached the extraordinary situation where the ownership of property has become a liability, not an asset."

Henry D. Sharpe, Brown & Sharpe Mfg. Co., Providence, R. I., also inveighed against excessive govern-

mental expenditures and taxation. He warned against many "economic delusions" that are an outgrowth of the times, saying that there is much faulty reasoning today with respect to our problems. He declared that the depression has not proved that the capitalistic system is fundamentally unsound, but feared that if present tendencies go unchecked the "creation of wealth will be discouraged to the detriment of civilization."

Another who found fault with much of the present-day thinking is James A. Emery of Washington, who said that "a bear market for production is a bull market for bunk." Mr. Emery analyzed the legislative program in Congress. He said it was important for manufacturers who are in favor of or opposed to certain legislation to know that most of the bills acted upon are actually framed in committee; therefore, appeals for or against pending legislation are seldom effective unless put before the committees which are handling such bills.

Agreements to Balance Production Might Be Held Legal

Walker D. Hines, war-time railroad administrator, discussed the anti-trust laws and their adaptability to present-day conditions. He expressed the view that agreements to balance production with demand in industries in a state of chronic over-production should not be held in violation of the law when accompanied with appropriate and practicable safeguards designed to increase production as demand increased. He said the Supreme Court had not condemned any such agreement and pointed out that over-production of this character actually worked to restrain trade, since buyers were afraid to buy beyond immediate needs when over-production threatened a continual depressing of the price basis on which they would have to continue to do business, whereas a balanced production would promote trade by removing this fear.

He also pointed out that the interpretation of the very general language of the Sherman Act of 1890 had been through an epoch when demand was generally up to or beyond capacity and when any curtailment of production naturally lent itself to restraints of trade, but that there had since been a fundamental change in conditions, due to progressive increase in productive capacity along with a cessation of the earlier expansion in demand, so that balancing of demand with production would now quite generally be promotive of trade; and hence the courts should in making current applications of the law equally consider what would or would not be restraints of trade in the present epoch.

As to agreements to fix and maintain uniform prices, he pointed out that the United States Supreme Court had shown opposition to them in the Trenton Potteries case, but he said

that the agreement involved in that case had contained no qualifying clauses providing for future revision of prices in accordance with changing conditions or lower costs.

He thought that further interpretations by the United States Supreme Court would likely clarify the situation more than any legislation that seemed to be in prospect. He urged however that, in view of the tendency to misconceive business methods, there should be, in the event of any legislative inquiries, the most thorough presentation of the economics of the situation.

Inflation is not the cure for the depression, in the opinion of Fred I. Kent, Bankers Trust Co., New York, who discussed the fiscal situation as follows:

"In times of stress it seems inevitable that there should be a cry for inflation, and the present depression is no exception. Every time in history, however, when inflation has been brought about through fiat, or semi-fiat, issues of currency that were paid out directly or indirectly by government, the people have suffered. Government cannot pay out currency without taxation to cover it any more than it can meet its obligations or pay people for doing nothing by means of checks without taxation to cover them.

"When we come out of the present depression, as we shall, we will find that there is an expansion of credit going on, but such expansion of credit will be due to the borrowing of industry for the purpose of employing men, buying raw materials and processing goods.

"When confidence returns to industry and in growing numbers those engaged in production feel justified in anticipating markets for their goods and in ordinary course borrow from the banks, the deflation under which we are now suffering will be stopped and the expansion of credit which will then take place will be an evidence that reconstruction has set in.

"You cannot force credit down the throat of industry, no matter how much is made available, and inflation as technically separated from the business expansion of credit can only be harmful. Such stimulation as inflation may bring, if it brings any, is temporary and it must always be paid for after it is over. Such payment, however, almost inevitably results in far greater cost than is represented in gain from such temporary stimulation as the inflation might cause.

"This is true in large part because, when inflation does prove to be stimulating to business, it creates a superficial buying power that does not and cannot last. This, in case the inflation is carried far enough, results in the increase of capacity for production on the part of industry beyond normal demand. Just as soon, therefore, as any superficial and temporary buying that might be induced by in-

flation is carried out by means of currency payments to individuals, a vacuum in consumption is created. This is often far-reaching in its bad effects and throws men out of employment to such an extent that it again establishes the vicious circle that the inflation was falsely undertaken to break, and conditions then become even worse than those which prevailed before the vicious uneconomic step was taken.

"When men are sucked into the vortex of a superficial demand for certain goods it develops an unbalanced production and draws them away from what might otherwise have been steady employment.

"There is no sound reason for undertaking inflation in the United States today. There is every need for the reestablishment of industry and commerce and when that takes place an expansion of credit will follow, but if we are going to protect our country from unnecessary disaster we must not mix cause and effect and try to create effect, hoping that it will reestablish cause; in other words, engage in inflation with the hope that it may result in the reestablishment of industry because the reestablishment of industry must be followed by an expansion of credit."

Unemployment Benefits to Come

Dr. Charles Prosser, director of the Dunwoody Institute, Minneapolis, said that some form of unemployment benefits for individual companies or trade groups would soon become the vogue. He believed that such insurance against unemployment would tend to stabilize employment, as manufacturers will watch the turnover more closely. Dr. Prosser said that as business recovery develops the most capable men will be hired first, and the incapable may find it difficult to get jobs.

Prof. Ralph S. Meriam, Harvard University, argued against the adoption of Federal or State unemployment insurance, citing the experiences of European countries with such social legislation.

Dr. W. Elmer Ekblaw, Clark University, Worcester, Mass., gave some interesting economic facts about Russia and ventured the opinion that Russia would never become a serious factor in world trade for the reason that most of its resources will be needed to maintain its own population. He called attention to the fact that only a small part of Russia's vast area is productive or habitable, 87 per cent of the population living on 15 per cent of the land.

George E. Sokolsky discussed the Far Eastern situation, particularly that of Manchuria. Committee reports were presented by Harold S. Falk, Milwaukee, on industrial education, and by safety and accident prevention by Philip M. Morgan, Worcester, Mass.

Iron and Steel Imports Gained 50 Per Cent in March

**Tin Plate Receipts 2529 Tons—Dutch Pig Iron Also Large Item—
Belgium Principal Steel Shipper**

WASHINGTON, April 26.—Marking the first sizable incoming movement of the kind for many years, imports of tin plate to the United States in March totaled 2529 gross tons, or the equivalent of 566,600 base boxes of 100 lb. each. All but two tons from Germany came

from the United Kingdom. The total import movement of iron and steel was 41,031 tons, an increase of 50 per cent over that of February.

Exports were 49,927 tons, a gain of 23 per cent over those in February, but only 8826 tons in excess of the incoming shipments.

The tin plate imports were valued at \$157,884, or \$2.80 per base box of 100 lb., channel ports, and, of the total, 2123 tons was entered at San Francisco. Tonnages received at other ports included 219 tons at Baltimore; 130 tons at New York; 24 tons at Boston; 22 tons in the Washington district and nine tons in the Wisconsin district. The price laid down at American ports was \$70.96 per gross ton or \$3.17 per base box, comparing with the official domestic price of \$4.75, Pittsburgh.

Merchant Bars Largest Item of Steel Imports

The largest incoming movement in the finished lines comprised 3529 tons of merchant steel bars. The principal

Imports of Iron and Steel Products into the United States

	(In Gross Tons)		Three Months Ended March	
	March		March	
	1932	1931	1932	1931
Pig iron.....	18,829	7,357	33,932	21,954
Sponge iron.....	51	.....	51	208
Ferromanganese and spiegeleisen*.....	1,557	3,022	5,794	9,195
Ferrochrome†.....	.....	21	30	21
Ferrosilicon‡.....	.....	65	20	273
Other ferroalloys.....	.....	125	250	409
Scrap.....	507	1,348	1,476	3,477
Pig iron, ferroalloys and scrap.....	20,944	11,938	41,553	35,637
Steel ingots, blooms, billets, etc.....	368	2,300	1,895	6,520
Wire rods.....	973	455	2,802	2,077
Semi-finished steel.....	1,341	2,755	4,697	8,597
Concrete reinforcement bars.....	3,189	3,944	8,802	9,591
Hollow bar and drill steel.....	98	187	182	332
Merchant steel bars.....	3,529	5,122	10,541	12,852
Iron bars.....	41	73	158	216
Boiler and other plate.....	5	480	35	563
Sheets, skelp and saw plate.....	1,566	2,362	4,561	5,616
Tin plate.....	2,529	12	2,605	37
Structural shapes.....	2,538	6,938	9,236	18,058
Sheet piling.....	.....	.....	.....	56
Rails and rail fastenings.....	72	113	475	862
Welded pipe.....	478	1,076	1,170	1,660
Other pipe.....	265	866	835	2,730
Barbed wire.....	1,551	502	4,276	1,534
Round iron and steel wire.....	211	195	590	758
Flat wire and strip steel.....	59	65	198	172
Wire rope and strand.....	146	247	414	492
Other wire.....	23	96	180	229
Hoops and bands.....	1,454	1,841	5,384	4,648
Nails, tacks and staples.....	930	676	2,527	1,837
Bolts, nuts and rivets.....	7	167	44	400
Other finished steel.....	5	11	25	21
Rolled and finished steel.....	18,696	24,974	52,238	61,698
Cast iron pipe and fittings.....	.....	588	11	1,317
Castings and forgings.....	50	137	323	424
Total.....	41,031	40,392	98,822	110,073

*Manganese content only.

†Chromium content only.

‡Silicon content only.

United States Imports of Pig Iron by Countries of Shipment

	(In Gross Tons)		Three Months Ended March	
	March		March	
	1932	1931	1932	1931
United Kingdom.....	200	793	700	893
British India.....	5,651	3,787	9,808	15,426
Germany.....	.....	.....	135	.....
Netherlands.....	12,718	1,285	22,450	2,020
Canada.....	110	.....	110	.....
France.....	.....	.....	.....	25
Belgium.....	.....	.....	200	.....
Norway.....	.....	35	.....	86
Sweden.....	.....	1,102	98	2,978
All others.....	150	355	431	526
Total.....	18,829	7,357	33,932	21,954

Sources of American Imports of Iron Ore

	(In Gross Tons)		Three Months Ended March	
	March		March	
	1932	1931	1932	1931
Canada.....	180	9	218	9
Cuba.....	.....	11,500	33,000	11,500
Chile.....	21,652	85,133	110,232	261,313
Spain.....	49	.....	49	19,597
Sweden.....	.....	22,904	.....	29,894
French Africa.....	.....	4,500	.....	4,500
Russia.....	8,100	30,184	22,000	65,947
Other countries.....	15,563	15,041	35,130	29,726
Total.....	45,544	169,271	211,629	412,486

Exports of Iron and Steel from the United States

	(In Gross Tons)		Three Months Ended March	
	March		March	
	1932	1931	1932	1931
Pig iron.....	175	324	877	1,349
Ferromanganese.....	.....	.....	5	13
Scrap.....	13,256	16,946	28,711	37,108
Pig iron, ferroalloys and scrap.....	13,431	17,270	30,593	38,470
Ingots, blooms, billets, sheet bar.....	186	462	369	1,565
Wire rods.....	2,319	7,318	5,822	20,219
Wire rods.....	2,733	5,644	6,309	10,256
Semi-finished steel.....	5,238	11,424	12,500	32,040
Steel bars.....	1,364	5,823	4,764	11,535
Alloy steel bars.....	327	453	597	1,654
Iron bars.....	68	84	111	262
Plates, iron and steel.....	1,237	6,243	3,074	13,920
Sheets, galvanized steel.....	2,513	4,805	7,633	11,110
Sheets, galvanized iron.....	182	1,002	406	2,152
Sheets, black steel.....	3,135	7,973	8,926	24,061
Sheets, black iron.....	242	431	741	1,673
Hoops, bands, strip steel.....	2,121	3,778	6,330	11,027
Tin plate;terne plate.....	2,336	8,502	10,022	22,982
Structural shapes, plain material.....	2,600	11,440	4,173	29,288
Structural material, fabricated.....	1,239	3,839	4,009	12,939
Tanks, steel.....	557	3,718	929	5,972
Steel rails.....	822	3,516	3,880	9,913
Rail fastenings, switches, frogs, etc.....	730	1,699	1,609	2,048
Roller tubes.....	242	763	725	2,193
Casing and oil-line pipe.....	2,105	1,581	3,620	8,079
Pipe, black and galvanized, welded steel.....	2,054	3,469	6,816	11,711
Pipe, black and galvanized, welded iron.....	305	421	560	1,345
Plain wire.....	1,397	1,101	3,140	3,771
Barbed wire and woven wire fencing.....	2,562	2,456	5,329	7,402
Wire cloth and screening.....	56	86	142	250
Wire rope.....	145	372	491	796
Wire nails.....	615	670	2,293	3,209
Other nails and tacks.....	448	353	1,005	1,056
Horseshoes.....	2	4	27	8
Bolts, nuts, rivets and washers, except track.....	266	519	754	1,458
Rolled and finished steel.....	29,077	74,411	82,037	201,334
Cast iron pipe and fittings.....	375	2,273	1,297	7,004
Malleable iron screwed fittings.....	155	489	404	1,757
Car wheels and axles.....	385	906	865	2,037
Iron castings.....	106	489	422	1,537
Steel castings.....	138	450	362	1,601
Forgings.....	541	885	1,368	2,481
Castings and forgings.....	1,760	5,492	4,718	16,117
All other.....	481	727	1,231	2,043
Total.....	49,927	109,324	131,079	293,204

countries supplying this tonnage were Belgium, 2034 tons; Germany, 722 tons, and France, 593 tons. The most important ports of entry were New York, 1901 tons; Los Angeles, 712 tons; Boston, 542 tons; San Francisco, 437 tons; Galveston, 229 tons; New Orleans, 151 tons, and the Washington district, 133 tons.

Imports of concrete reinforcement bars rose to 3189 tons from 2185 tons, and the principal countries of origin were Belgium, 2408 tons; Germany, 575 tons, and France, 206 tons. Incoming shipments of structural steel were 2538 tons, of which 1651 tons came from Belgium and 815 tons from France. Of the 1454 tons of hoops and bands imported, 617 tons came from Belgium; 511 tons from France, and 260 tons from Germany. Of the 1551 tons of barbed wire imported, 1239 tons came from Germany, which also supplied 743 tons of nails in the incoming movement of 930 tons of nails, tacks and staples.

Netherlands Shipped 12,718 Tons of Pig Iron to United States

The largest receipts were pig iron, 18,829 tons, of which 12,718 tons came from the Netherlands and 5651 tons from India. Imports of ferromanganese were 1557 tons, Canada supplying 750 tons; France, 396 tons; Norway, 217 tons, and the United Kingdom, 155 tons. All of the 2053 tons of manganese ore imported came from Soviet Russia.

Totaling 13,256 tons, scrap was the largest single item of exportation, Japan taking 11,203 tons and Canada 1636 tons. Canada took all of the 2319 tons of skelp exported and 2865 tons of the 3135 tons of outgoing black steel sheets. The Philippine Islands took 1996 tons of the 2513 tons of galvanized sheets exported.

Exports to Canada totaled 15,641 tons and those to Japan were 13,807 tons, these two countries taking approximately 72 per cent of the aggregate shipments.

Canadian Steel Output Gains for Third Month

TORONTO, April 25.—Production of steel ingots and castings in Canada in March gained for the third successive month, while pig iron output gained for the second month. Output of ferroalloys declined. March output figures in gross tons and comparisons follow:

	March, 1932	Feb., 1932	March, 1931
Pig iron.....	17,989	16,567	57,116
Steel ingots and direct steel castings....	43,572	28,469	99,341
Ferroalloys....	1,295	1,131	4,526

Twenty electric industrial trucks and tractors were shipped in March as against 26 in February, according to reports received by the Bureau of the Census from 10 leading manufacturers.

Rochester Purchasing Agents Propose Steel Prices on "Profitable Level"

THE Rochester (N. Y.) Purchasing Agents' Association was expected to take action at a meeting on Wednesday night of this week toward the establishment of base prices for steel that will allow a fair return to the industry. Joseph E. Gore, chairman of the national affairs committee of the Rochester association and purchasing agent of the Rochester Smelting & Refining Co., has issued the following statement:

No group as yet has shown itself powerful enough to stabilize prices. Manufacturers are restrained by the Sherman anti-trust act from taking concerted action to check the price decline, and the sales end of industry has proved itself impotent.

The National Association of Purchasing Agents, representing 80 per cent of the industrial buying power in the United States, we believe, can turn the tide.

We, therefore, will recommend that the executive committee of the National Purchasing Agents' Association appoint a group of buyers to meet with representatives of the key industry, steel, to seek the establishment of base prices for that product which will allow a fair return to the industry.

We believe that such united action would be welcomed by the steel makers and would be followed by similar price agreements with the buyers in other industries.

At the Wednesday night meeting the National Association of Purchasing Agents was to be represented by its secretary, George A. Renard, of New York. If the Rochester association adopts the proposal suggested by Mr. Gore, the resolution will be transmitted to the executive committee of the National association, which will have power to act for more than 4000 buyers.

Ohio River Shipments of Steel Lower in March

Shipments of iron and steel products on the Ohio River in the Pittsburgh district during March amounted to 33,254 net tons, according to the United States Engineer Office, Pittsburgh. This compares with 40,737 tons in the preceding month and with 104,792 tons in March, 1931. On the Monongahela River, 32,324 tons of steel was moved last month, compared with 20,089 in February and with 76,137 tons in March of last year. Allegheny River iron and steel shipments in March amounted to 550 tons, compared with 2200 tons in the previous month. There was no movement in March, 1931.

A time record in barge movement of steel products on the Ohio and Mississippi Rivers is believed to have been established by the steamer A. O. Ackard of the Carnegie Steel Co. in

a recent run to New Orleans. The Ackard pushed a tow of 5321 tons of steel from Pittsburgh to New Orleans, a distance of 1939 miles, dropping tonnages at three intermediate ports, in 10 days and 20 hr. The tow was made up of 10 barges. The run to Cincinnati was made in three days and 13 hr.; to Louisville in four days and 15 hr., and to Memphis in seven days and 20 hr. The best previous down-river record of the Carnegie fleet was made by the Monongahela, with a 13-barge tow, in 11 days and 15 hr.

H. S. Wilkinson Believes Situation Is Improving

Horace S. Wilkinson, chairman, Crucible Steel Co. of America, addressing the annual meeting of stockholders on April 20, said: "Reports from all sections of the country show that many underlying economic conditions are improving and that it is only a matter of time until this will be true in the steel industry. Incoming orders, upon which operations of the company are based, are at about 21 per cent of normal capacity."

The stockholders' list of the company disclosed that Mr. Wilkinson owns 161,492 common shares, or approximately 36 per cent of those outstanding, and 9310 shares of preferred. The second largest holder is the Shenango Furnace Co., Pittsburgh, with 44,260 common shares.

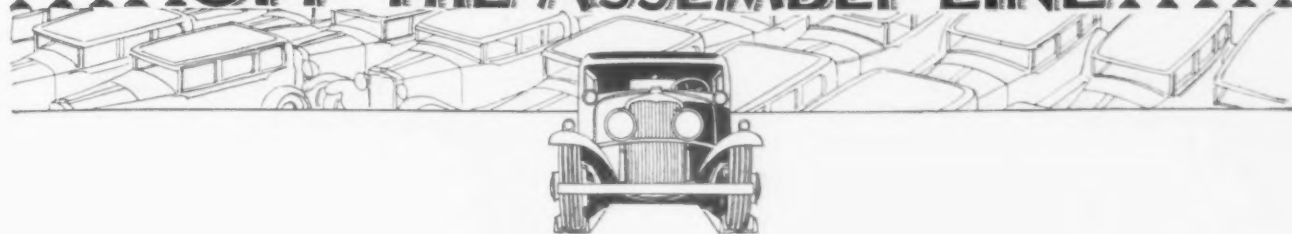
Canadian Carborundum To Expand Plant

The Canadian Carborundum Co., Niagara Falls, Ont., will expand its plant by the addition of two structures, one 50 x 150 ft. and the other 95 x 115 ft. The cost of this expansion, including machinery of special design, will be about \$250,000. The larger addition will house a complete plant for the mixing of bonded materials and abrasive grains, while the smaller structure will be used as a fabricating plant for the manufacture of grinding wheels of all types.

Contract for the structural steel for these buildings has been awarded to the Reid & Brown Structural Steel & Iron Works, Ltd., Toronto.

Bethlehem Steel Co. has contracted with H. A. Brassert & Co., Chicago, to provide the No. 8 blast furnace hot blast stoves at Johnstown, Pa., with Brassert graduated zoned filler brick inserts, converting the present stoves into high efficiency stoves.

OFF THE ASSEMBLY LINE



Motor Car Output in May Promises to Be Best of the Year

DETROIT, April 25.

ALTHOUGH motor car output continues at a level which is far from satisfactory, a few bits of encouraging news came to light the past week. Reflecting improved sales since the first of April, Chevrolet production schedules for May have been increased 25 per cent and now stand at 50,000 cars. Plymouth promises to maintain next month at least the same pace as during April, which means the assembly of 25,000 cars. Meanwhile, Ford is expected to step up operations, with 50,000 cars as the goal for May. Under the circumstances, next month will be the best of the year from a production standpoint, exceeding this month, which should show a considerable gain over March. Usually the automobile industry is at its peak during April or May, but this year likely will be an exception, since Ford will not attain volume production until well into the summer. It will be recalled that in 1928, when model A was introduced, Ford activities were accelerated as the year progressed, with the result that the year's high spot in assemblies was not reached until August.

Developments in the past few days indicate that Ford has made notable progress in swinging into production of V-eight motors. Late last week assembly of cars had reached 1100 units a day, of which 450 were eights. Branch assembly plants now have on hand over 50,000 four-cylinder motors and a limited number of eight motors. At least three of them, starting with Edgewater, N. J., plant will commence assembling eights this week. Over the week end a few eights appeared on the streets of Detroit, creating much favorable comment. It now seems assured that by the end of April Ford will have attained its production goal of 1000 V-eight motors a day and that it will be able to fulfill its schedule of about 50,000 cars during May.

How soon Ford will be able to push

Ford makes more rapid progress in getting out V-eight motors.

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May will show gain over April in automobile production.

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Chevrolet's May schedule increased 25 per cent, now standing at 50,000 cars.

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On account of slowness of Ford expansion, industry's peak production month is likely to be later than usual.

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up operations on to a basis of 100,000 cars a month is a matter of speculation, but many hold to the opinion that July or August will be the earliest date. The Ford company has as its objective building half a million cars as rapidly as possible, although no date has been set for completion of that task.

Ford of Canada has a schedule of 5000 cars in May. It has been getting all of its eight motors from Rouge, but shortly will begin manufacturing them at its East Windsor plant.

While efforts are being exerted to overcome the production difficulties on model 18, Ford is assembling the four-cylinder model B and the model BB commercial cars at branch plants. Production of the latter is said to be running at about 500 units a day. Incidentally, the battle for supremacy in the low-price field will be just as active in the truck field as in passenger cars. With 25 per cent more power, many refinements and a reduction of \$25 in price, the new Ford commercial cars are making a bid for supremacy. In fact, it is understood that Ford is aiming to get 50 per cent of the country's truck business this year. Although no official figures are

available, orders for new Ford passenger cars are believed to have passed the 400,000 mark, all of them secured by deposits. Ford is now operating four open-hearth furnaces at Rouge, including the 400-ton furnace for melting old cars.

Chevrolet Increases Steel Specifications

In addition to the sheet and strip steel purchases last week for 65,000 cars, exclusive of body requirements, Ford will shortly buy a small tonnage of sheets for delivery to its body builders. However, no major orders for steel are expected to be placed until some time in May. Releases to parts makers have not been large, as sufficient stocks of parts have been accumulated in recent weeks to fill requirements for the immediate future. Ford probably will not buy steel bars for some time, as its own steel plant can supply bars until production gets about 60,000 cars a month.

Chevrolet's decision to build more cars in May than were scheduled a few weeks ago has been felt in heavier steel specifications, especially for strips and bars. The company's gray iron foundry at Saginaw operated five days last week and will be on the same program this week, pouring about 1000 tons of iron a day. Fisher Body Corp. will buy some sheets for its Cleveland plant within a few days, but the quantity is not large. General Motors is consolidating its manufacturing interests in the southern Michigan district as rapidly as possible, the trend seeming to be toward concentration of the production of parts here instead of having them scattered about the country in isolated plants. All administrative offices and manufacturing at Pontiac have been centered at the Pontiac factory, leaving the Oakland plant free for other work. At Buick the purchasing, production and traffic direction have been put in the hands of one man; it has long been the practice at Oldsmobile to have purchasing and production un-

der one head, as these two activities are allied.

Large Savings in Reduced Overhead

Observers see in the changes taking place a stripping of all excess baggage by General Motors preparatory to the battle for survival now starting. Chevrolet is pitted against Ford and Plymouth, Cadillac against a new Lincoln, an expansion by Packard and other high-price makers, and Buick-Pontiac-Oldsmobile against an array of medium-price cars. Millions already have been saved by General Motors in eliminating duplication of overhead and in consolidating operations and the months ahead are expected to bring further results.

Chrysler Corp. continues relatively to show the greatest strength in the industry. In retail sales it doubled its percentage of the industry's business during the first quarter. DeSoto has been making spectacular gains, reporting sales of 4059 cars in March. Plymouth, of course, is the outstanding performer in the Chrysler group. Graham sold 6124 cars in the first three months of this year, compared with 6114 in the same period in 1931.

Manganese Bronze Foundries Merged

The American Manganese Bronze Co., Holmesburg, Philadelphia, has purchased Paul S. Reeves & Co. of Philadelphia, which operate a foundry for the manufacture of bronze castings. An announcement of the purchase of the Caskey Brass & Bronze Co., Philadelphia, by the American Manganese Bronze Co. appeared in THE IRON AGE of April 21, page 958. The business of the Reeves and Caskey foundries is now being handled at the Holmesburg plant of the American Manganese Bronze Co. Samuel K. Reeves, president of Paul S. Reeves & Co., has become a director and vice-president of the American Manganese Bronze Co., and Frank E. Shipley, president of the Caskey Brass & Bronze Co., has also become identified with the purchasing company.

Both of the companies that have been acquired have been long engaged in the foundry business in Philadelphia. Paul S. Reeves & Co. have been in continuous operation since 1869, while the Caskey Brass & Bronze Co. was founded in 1875.

Jones & Laughlin Shows Loss in Quarter

Jones & Laughlin Steel Corp., Pittsburgh, had a net loss in the quarter ended March 31 of \$2,399,089 after all charges, including reserves for depreciation and depletion and bond interest after preferred dividend payments. The total charge to surplus amounted to \$3,426,582.

Higher Iron and Steel Duties Adopted by Great Britain

Continental Semi-Finished Steel, Including Duties, Is Still Cheaper Than English Steel—Pig Iron Excepted

LONDON, ENGLAND, April 25 (By Cable).—The tariff advisory committee has recommended all-round increases on iron and steel and its products, including metal furniture, hollow ware, stoves, tubing, railway and tramway material, springs and spring steel, wire, wire netting, nails, screws, rivets, bolts, nuts, cutlery, locks, keys and hinges; all of these taking 30 per cent duty. Agricultural forks, spades, scythes, etc., take 20 per cent duty. Other tools and parts are dutiable at 30 per cent; electrical wire, cables and apparatus, carbons, batteries, meters, cookers and heaters take 30 per cent; doors, window frames and casements, 25 per cent; plows, reapers, seeders, shears, threshers, tractors, 20 per cent; all other machinery, 30 per cent.

Spiegeleisen, ferromanganese, alloy steel and all descriptions of iron and steel, excepting pig iron, are dutiable at 33½ per cent.

The committee recommended that 33½ per cent duties be imposed for three months only, pending the result of the committee's investigations. All duties are effective from midnight Monday, April 25.

British industry is generally satisfied with the new duties, although there is some adverse comment be-

cause no extra duty was levied on pig iron. However, Continental pig iron competition is negligible, the bulk of the imports coming from India and, therefore, duty free.

The revival in the demand for iron and steel is expected to be only gradual under the new tariffs, as foreign stocks are still large. Continental semi-finished steel, with the new duties added, is still cheaper than English steel, and consumers are placing fresh business.

Belgian critics deplore the fact that no friendly meeting had been arranged between British and Belgian producers prior to the adoption of the tariff. They fear increased Belgian unemployment.

There have been a few export sales of Continental steel to India and South America, but orders are still badly wanted.

The Continental wire rod cartel has fixed the second quarter quota at 260,000 tons.

Tin plate business is quiet, buyers being unwilling to pay makers' prices, and business is confined to merchant sales at prices ranging down to 15s. per base box, f.o.b. works port. Japan has placed 10,000 boxes of oil can sizes with Welsh mills, also 10,000 boxes with German mills. British exports of tin plate for March included 6559 tons to the United States and 566 tons to American territories, but it is admitted officially that these figures include some tonnage shipped in February.

France and Germany are willing to agree on the formation of an international hoop and strip cartel.

One session of the sixth national aeronautic meeting of the American Society of Mechanical Engineers, to be held June 6-8 at the Hotel Statler, Buffalo, will be devoted to metal airplane construction. The following topics will be covered: Steel airplane construction; aluminum in aircraft; evolution of metal construction; and a comparative study of welded and riveted fuselages. Other sessions will be devoted to aerodynamics, navigation, engines, airship and airplane carriers, maintenance, design, and fuels and engines. The latter session will include a paper on aircraft engine steel.

British Prices, f.o.b. United Kingdom Ports

	Per Gross Ton	
Ferromanganese, export	£9 0s.	
Billets, open-hearth...	5 5	to £5 10s.
Black sheets, Japanese specifications	9 12 6d	
Tin plate, per base box	0 15	to 0 16
Steel bars, open-hearth	7 17½	to 8 7½
Beams, open-hearth	7 7½	to 7 17½
Channels, open-hearth	7 12½	to 8 2½
Angles, open-hearth	7 7½	to 7 17½
Black sheets, No. 24 gauge	8 0	to 8 10
Galvanized sheets, No. 24 gauge	9 10	

Continental Prices, f.o.b. Continental Ports

	Per Metric Ton, Gold £ at \$4.86
Billets, Thomas	£2 2s. 6d
Wire rods, No. 5 B.W.G.	4 10
Black sheets, No. 31 gauge, Japanese	11 5
Steel bars, merchant	2 5
Beams, Thomas	2 5
Angles, Thomas, 4-in. and larger	2 4
Angles, small	2 6
Hoops and strip steel over 6-in. base	3 5
Wire, plain, No. 8	5 7½
Wire, barbed, 4-pt., No. 10 B.W.G.	8 10

PERSONALS



W. S. STEPHENSON



H. G. UPHOUSE

WILLIAM S. STEPHENSON and HARRY G. UPHOUSE, who, as stated in last week's issue of THE IRON AGE, have formed the Philadelphia Steel Sales Co., 1212 Commercial Trust Building, Philadelphia, representing the Otis Steel Co. and the Corrigan, McKinney Steel Co., both of Cleveland, in the sale of steel products in that territory, intend also to represent other manufacturers.

R. C. GLANDORF, heretofore advertising manager of Aluminum Industries, Inc., Cincinnati, has been promoted to the post of special representative and will assist the various district managers and jobbers in contact work.

HENRY A. TAUBENSEE, of 400 West Madison Street, Chicago, has been appointed representative in that territory for the Brainard Steel Corp., Warren, Ohio.

C. WALTER SPALDING, who has been identified with the Ewarts works, Indianapolis, Ind., of the Link-Belt Co., Chicago, has been appointed sales manager of that division.

C. J. G. FISCHER has been made representative on the Atlantic seaboard, with headquarters at Plainfield, N. J., for the Permold Co., Cleveland. REX I. LEE and his associates, A. L. EDWARDS and E. D. LOOMIS, Highland Park, Mich., are the company's representatives in Michigan and Toledo.

WILLIAM ROBERT WILSON has retired as general manager of the Reo Motor Car Co., Lansing, Mich., after serving two years in that capacity. It was during his regime that the Reo Royale, which set the pace for the automobile industry in stream-line design, and the Reo light truck were introduced. RICHARD H. SCOTT, president, has resumed the title of general manager.

WILLIAM S. GRAHAM has retired from the position of vice-president in charge of manufacturing of the Hupp Motor Car Corp., Detroit, due to ill health. He is planning to take a European trip shortly.

MORGAN J. HAMMERS, vice-president and general manager, Petroleum Heat & Power Co., New York, has been elected president of the American Oil Burner Association.

M. T. LOTHROP has resigned as president of the Timken Roller Bearing Co., Canton, Ohio, and has been succeeded by H. H. TIMKEN, chairman of the board. Mr. Lothrop has been in the company since 1911 when he was employed as a metallurgist. He has been president three years and previously served some time as vice-president. He also has resigned from the board of directors. His place on the board has been taken by F. J. GRIFFITHS, president, Timken Steel & Tube Co.

OBITUARY

DR. CARL LEO MEES, president emeritus of Rose Polytechnic Institute, died at Terre Haute, Ind., on April 19, aged 79 years.

HARRY GEAN BLACK, vice-president and general manager of the Texas Nail & Wire Mfg. Co., Galveston, died in an airplane crash at the Lufkin, Tex., airport on April 19, aged 43 years.

WILLIAM ROBERTSON, formerly treasurer of the Standard Chain Co., Pittsburgh, died at his home in New

Brighton, Pa., on April 22, aged 88 years. He began his business career with the Pittsburgh Hinge Co., Beaver Falls, Pa., and later served as secretary and treasurer of the Baker Chain Co., prior to the formation of the Standard organization. He had been retired for 18 years.

PETER BOYD, for many years identified with the pipe industry in the Pittsburgh district and for a time general superintendent of the National Tube Co., died at his home in Beaver, Pa., on April 22. He was born in Scotland 83 years ago, and came to the United States when he was 21. He was active in the construction of the Pennsylvania works of the National Tube Co., Pittsburgh, and later served as superintendent of the Riverside works, Wheeling, W. Va.

United Metal Trades Association Meets

TACOMA, Wash., April 23.—Previous attendance records were broken at the twenty-sixth annual convention of the United Metal Trades Association. President Pape, reviewing the past year, stressed cooperation among employers and employees in spite of economic conditions. Reports from both Oregon and Washington showed lower production and wages but were sanguine as to the future. While the lumber industry is at low ebb, it is believed that pulp and paper will help all industry in this section. To date, wage reductions among association members average 12 per cent. Continuation of the training of mechanics in cooperation with trade schools was urged.

Speakers advocated that the steel industry become more interested in political affairs, to the end that better officials be elected.

A paper on aeroplane construction by G. W. Carr, general manager, Boeing Airplane Co., was followed by adjournment of the entire convention to the Boeing plant for close-ups of bomber and other operations.

The report of F. J. Danaher, secretary, stressed the dangers that will threaten if the anti-injunction law is passed. He also urged greater cooperation among member companies to seek new markets for new products.

Officers elected for the ensuing year are: Albert Worley, Tacoma, president; Fred C. King, Portland, Ore., vice-president; Frank McKenzie, vice-president; H. C. Forsberg, secretary; William Casey, treasurer.

Production of steel barrels in February totaled 367,472 units, against 359,685 in January, according to reports received by the Bureau of the Census from 27 establishments.

• • EDITORIAL

All Out of Step Except Casey?

DO you remember the story of the Irish recruit who was reprimanded for being out of step and who rejoined: "If you please, sir, they're all out of step but me"?

The present day situation with regard to governmental expenses as contrasted with private business and industrial budgets brings this story to mind.

The National Industrial Conference Board has made some exhaustive studies of government costs since 1929 in comparison with business happenings over a similar period.

From December, 1929, to February, 1932, industrial production diminished 32 per cent.

From Dec. 1, 1929, to April 1, 1932, our stock securities depreciated 61.5 per cent.

From December, 1929, to February, 1932, wholesale commodity prices shrank 28.9 per cent.

From December, 1929, to February, 1932, average weekly industrial earnings diminished 29.6 per cent.

During 1930 and 1931 the number of employees in 1500 industrial, financial and commercial companies decreased 26 per cent.

The federal governmental fiscal year of 1931-1932 as estimated will show an increase in cost of 32.2 per cent as compared with the period for 1929-1930, exclusive of debt charges.

State and local governmental costs have increased in even higher proportion.

Are all out of step except Casey?

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Buyers and Sellers May Both Fight Price Cutting

INDUSTRIES which make and sell materials and products are apparently unable to prevent or persuade individual members to refrain from the suicidal practice of selling below cost. From the standpoint of the prevention of this practice, there is a fair alibi in the anti-trust laws. From the standpoint of persuasion there is no such excuse. It may be illegal to knock a man down in order to prevent him from cutting his own throat, but no court could restrain a bystander from attempting persuasion in such a case.

When the sellers of an industry cannot seem to stem the tide of price cutting, the buyers of industry cannot be blamed for accepting bargains. The old philosophy of trade was that the seller's loss was the buyer's gain. It

is refreshing and encouraging to note that this doctrine is becoming obsolete. Witness the action of the Purchasing Agents' Association of Rochester, N. Y., this past week. It proposes to make use of the organized buyers of this country to check the decline in commodity prices.

Referring to the apparent inability of individual groups of producers to stabilize their prices, Joseph E. Gore, chairman of the national affairs committee of the Rochester section of the N.A.P.A. stated that his committee will recommend to the executive committee of the association that it appoint a group of buyers to meet with representatives of the key industry, steel, to seek the establishment of base prices for that product which will allow a fair return to the industry.

"We believe," said Mr. Gore, "that such united action would be welcomed by the steel makers and would be followed by similar price agreements with the buyers in other industries."

The enlightened cooperation proposed augurs well for the future game of business. It will be of advantage to all when both teams recognize selling below cost; or buying below cost, to be "foul play."

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Making Versus Buying

IN days of diminished volumes, the maker or builder of industrial products is faced with the temptation to make component or standard parts that he would normally buy. One illustration of this is the case of a railway repair shop that is now making its own nuts and bolts.

If, with the much larger volumes of normal times, the maker of a product found it inexpedient from the profit standpoint to make rather than to buy standard commodities and parts, how much less opportunity has he to break even on them during slack times with smaller production quantities?

The trouble is that the cost of making versus buying is not properly figured. The manufacturer knows how much it will cost him to buy, but he does not know, in nine cases out of ten, the intangible elements in the cost of making the item he has customarily bought.

Bolts and nuts, in particular, are recognized as exceedingly low profit items. It takes a highly specialized plant, with large volume, to make money through making them. The profit made by the bolt manufacturer, today, if any, does not come from the product, but from plant, equipment, volume methods and experience.

It is still good business to let the supplier get his share of your business, especially on the small profit items.

C O M M E N T . .

Protecting Our Foreign Securities and Export Trade

WAYS and means to protect our foreign investments and our export trade are among the subjects of discussion in Washington. Assuming the leadership in this, the State Department is conferring with the Treasury Department as to methods of aiding American holders of defaulted foreign government bonds and also industrial stocks. The State Department, with the Department of Commerce, is also directing attention to ways of safeguarding America's export trade. That this is necessary is indicated by the rapid extension by European countries of tariff and other barriers against products from this country, while taking advantage of exchange dislocations to dump goods here below American costs.

Just what methods are being considered to protect American buyers of foreign securities is not yet apparent from State Department statements, although these would indicate the proposal to set up a system of official supervision of foreign issues, in which reliable financiers and economists would cooperate with some Government board. This has the earmarks of an extension of bureaucracy, but perhaps that is necessary to protect the gullible American investor during the next easy money period.

The protection of American export trade and the prevention of dumping of foreign made products can be more specifically handled. The Hawley-Smoot act has sufficient teeth to provide a deterrent to nations now subjecting our products to a maze of embargoes, quotas, licenses, evasive custom specifications and other trade harassing schemes. As much as it is hoped that it will not be necessary to use these teeth, there are points beyond which patience ceases to be a virtue and the nation which relies upon it becomes a "goat."

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Merchandising Succeeds Where Order-taking Fails

THERE are various ways of selling a product, but in good times and bad the most successful way is to give a customer practical ideas which he can use to increase profits.

The case of a manufacturer of laminated plastic materials comes to mind. He was convinced that his product could be applied as a veneer to wood doors and other wood building materials. He put his ideas before construction companies equipped with wood-working departments, but his persuasion failed to convince them of its practicability. Undaunted, he installed a wood-working department in his own factory to show the skeptics how to do what they said could not be done.

This department represented a considerable invest-

ment, but did successfully what the manufacturer's customers regarded as the impossible. Moreover, it accomplished its purpose at a small profit. Now the customers see the light and are planning to use the manufacturer's laminated plastic materials along the lines he pioneered for them.

Then there is the maker of small tools whose salesman went into a customer's plant seeking business. The customer had no order for him, but in the ensuing conversation revealed the details of a job on which he had not bid because he could not handle it. Always alert, the salesman quietly asserted that his company could work out for him a practical way to do the job and proceeded to keep his promise. The customer got the job and the salesman a sizable order.

These are only two examples of what a company can do to stimulate business by constructive selling. In this era of keen competition, accentuated by the depression, the aggressive and intelligent merchandiser has supplanted the order-taker.

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Postpone, But Do Not Cancel This Meeting

ABOUT a year ago an invitation was extended by the American Institute of Mining and Metallurgical Engineers to British metallurgists to visit this country in September, this year, and join with American technical societies in exchanging views on current problems. The invitation was accepted by the Iron and Steel Institute and the Institute of Metals—two of the finest technical organizations abroad. Elaborate plans for programs, plant visitations and entertainment have been in progress and metallurgists on both sides of the Atlantic have been looking forward keenly to a profitable interchange of opinions.

Recently however it was found necessary to change the plans completely. So severely has the world-wide depression affected relations in every walk of life, it has been found impracticable to carry out the original plans and the proposed international gathering has been cancelled for this year by mutual agreement.

It is to be hoped that ultimately this plan can be consummated. While there is a more or less constant interchange of opinion through the publication and discussion of technical papers independently in each country, nothing can take the place of the face to face interchange of views in a public meeting and in private or group conversations. Then too there is the rare privilege which grows out of such meetings of more intimately knowing prominent metallurgists and scientists whose names are familiar. Many remember the benefits of a similar plan put into effect about twenty years ago and are all the more eager for a repetition of the experience.

Steel Industry Pays Tribute to James A. Farrell

STEEL paid a handsome tribute to James A. Farrell on the evening of April 21. To signalize his retirement from the presidency of the United States Steel Corp., the American Iron and Steel Institute gave a dinner in his honor at the Waldorf-Astoria Hotel, in New York. It was an impressive occasion of magnificent appointments; some 675 of those who have been associated with him in one capacity or another came from far and near to join in the celebration, and Charles M. Schwab, president of the institute, who served as toastmaster, presented a watch to Mr. Farrell at the end of the flow of eulogy as a testimonial from the board of directors of the institute.

Myron C. Taylor, chairman, United States Steel Corp., came, he said, "to pay tribute to a great career and a great man; a man of unusual industry, tremendous energy, of constant fidelity; one who had achieved one end after another in a long series of successes." And seldom, he continued, does such an ovation come to a man in commerce and industry. He had occupied the chair of president in the Steel Corporation with rare distinction, Mr. Taylor added. "I know of no career comparable with that of Mr. Farrell nor one with the successes he has obtained. Victory crowns a career of unusual brilliance, and the benefits have flowed not for selfish interests, but largely for the enjoyment and enrichment of others."

Henry W. Phelps, president, American Can Co., in a speech that was convincing of the existence and value of sentiment in business, declared Mr. Farrell merchant preeminent. "He had sold American steel where it never had been sold before. In the course of a great many years he had bought from Mr. Farrell a good many hundreds of millions of dollars of goods and he found the dealings always square and honest. He admitted his company was the largest user of tin plate and the Steel Corporation's largest customer and for that matter the largest customer of some other steel companies. And he claimed that 'when you can get the customer to say such things as I have, there must be something in you.'"

High Quality of American Tin Plate

He began to buy tin plate, he said, before any was made in the United States, in 1887. He referred to the beginnings of the manufacture of tin plate in this country following the enactment of the McKinley tariff. He

doubted that the steel people were aware of the high quality of tin plate they produced, with improvement continued until today there is little tin plate made elsewhere that is usable on high-speed can making machinery, such as machines that turn out 300 cans a minute. He remarked that he imported British tin plate into Canada, but it took him four years to educate one British mill to produce tin plate that he could use.

Eugene J. Buffington, president, Illinois Steel Co., in his tribute emphasized also that the occasion illustrated the large place occupied in business by sentiment, asserting that in fact sentiment was sometimes the dominant factor in a business negotiation.

George M. Verity, chairman, American Rolling Mill Co., presented a declaration in behalf of the steel masters other than those of the Steel Corporation. He referred at some length to Mr. Farrell's sympathetic cooperation "whenever we choose to come to you with our problems, whether personal or those affecting the industry as a whole. The latch string was always out at your office from 8 o'clock in the morning until 6 in the evening and later if necessary."

Suggests Broadened Fields of Activity

"In a world that is so rapidly changing, where experience and constructive leadership is so much needed, you will find satisfaction," suggested Mr. Verity, "in the new demands that will be made upon you for continued service in the broader fields of economic and social reconstruction so vital to the preservation of this civilization."

Impromptu remarks were made by former Governor Alfred E. Smith, New York; Willis L. King, honorary vice-president of the institute and vice-president of the Jones & Laughlin Steel Corp.; Daniel Willard, president, Baltimore & Ohio Railroad, and William A. Irvin, Mr. Farrell's successor as president of the Steel Corporation.

Not Despondent Regarding Future

Mr. Farrell, in his response, said he could see no grounds for despondency regarding the future. "I find nothing in the present situation," he said, "to rob me of my faith in the essential soundness of our industrial system; I have lived through serious depressions in the past only to find that these pauses in our advance were followed



PAGE 2 of the menu souvenir of the dinner in honor of Mr. Farrell was a 11 1/2 x 16-in. lithograph in colors protected by a flyleaf of tissue and mounted within covers of deep blue carrying on the outside crossed sprays in gold of oak and laurel leaves wreathed around the initials J A F.

by years of increasing industrial growth and social progress. Faith and courage will carry us over our present obstacles.

"We have lost nothing of our industrial technique and efficiency. Our industries are ready at a moment's notice to meet trade recovery. We have only scratched the surface of trade possibilities in a world in which hundreds of millions of people will not indefinitely remain satisfied with a standard of living on the border line of a bare existence."

Factors in Success

He emphasized friendliness as an essential factor to business success. "Out of a long experience I have found no substitute for friendship as a lubricant of the ways down which we launch our business enterprises. No industry can be truly efficient which does not provide throughout all its activities an atmosphere of friendliness—the friendship which springs from an understanding of the other man's point of view and a recognition of the place of humanity in all our industrial activities."

Experience he also ranked high. "Experience and sound judgment alone can enable us to avoid attempted solutions of our present-day problems, which, whatever temporary relief he gained, may prove to be insecure footholds for those who come after."

Concentration on the immediate task was also offered as an important factor. Concentration, he said, has a tendency toward developing momentum and a day's task well done, which the spasmodic efforts of the most skilled worker or capable executive fail to accomplish. "Success," he added, "may only be wooed by having an infinite capacity for taking pains."

SUMMARY OF THE WEEK'S BUSINESS

Steel Production Shows Another Moderate Gain as Automotive Needs Increase

Substantial Rise in Motor Car Output Next Month Now Assured—
Structural Projects for Early Letting Pile Up

AT a time when poor quarterly earnings statements have accentuated the gloom pervading the iron and steel industry, indications of better business are likely to be discounted. Nevertheless the immediate outlook is for further improvement, although the extent of that betterment will depend in the last analysis on public confidence, as reflected in finance and in consumer buying.

The upward trend in automobile production, slow as it is, is having its effect on the operations of mills, foundries and parts manufacturers. Steel ingot production now averages 23 per cent of capacity, compared with 22½ per cent in the preceding week and 21 per cent two weeks ago. Gains in output in the Wheeling district, in the Valleys, at Cleveland and Chicago were only partly offset by a loss at Buffalo.

FURTHER expansion of motor car output next month is a certainty and it now seems probable that the increased flow of business from that quarter will be supplemented by liberal lettings of structural steel, mainly for public works. While fabricated steel awards for the week were only 10,340 tons, new inquiries totaled 33,600 tons. Structural shops are now figuring on fully 200,000 tons of work and expect 100,000 tons to be placed within the next month.

The plate market, which has been exceedingly quiet, is featured by the appearance of a call for bids in June on 50,000 tons for the Hoover dam. Tin plate operations remain a bright spot in the steel industry, although further increases above the present production rate of 50 per cent of capacity are being delayed pending a more accurate estimate of the vegetable pack.

ALTHOUGH demand seems to be on the mend, steel companies are faced with present realities rather than hopes, which have been so frequently dashed in the past. Their heavy losses in the first quarter have again focused attention on costs and a second wage cut now seems inevitable, much as they would like to avoid it. The chief consideration deterring such action is the fear that what would be saved in wages might be lost in lower prices. This apprehension is accentuated by the persistent efforts of motor car makers to break current quotations. While it can still be said that finished steel prices are holding, in the absence of severe tests, the scrap market shows disturbing weakness, with further price declines reported on numerous grades in different market centers.

THE Ford Motor Co. has made notable progress in swinging into production on V-eight motors. Last week assemblies reached 1100 units a day, of which 450 were eights. At least three branch plants will start assembling eights this week and it now seems assured that by the end of this month total production of this model will reach 1000 a day. Both Ford and Chevrolet are now scheduled to turn out 50,000 cars each in May, while Plymouth will at least duplicate its April total of 25,000 cars.

Ford's objective is to manufacture a half million cars as rapidly as possible. As a consequence, operations are likely to be heavy in July and August, which are usually dull months in the motor car trade.

A Cleveland stamping plant has been given a release of 60,000 running boards for Ford cars and will obtain steel from a Cleveland mill. A number of foundries in the Central West making Ford parts have received new orders for castings and are taking larger quantities of pig iron. Another indication of expanding Ford requirements is the appearance of sizable purchases and inquiries for ferroalloys for May and June delivery.

Line pipe prospects are poor outside of a prospective order for 8400 tons for export to the Irak Petroleum Corp., and an expected letting of 3500 tons for a Passaic, N. J., project. Cast iron pipe purchases by Los Angeles for its water department totaled 5000 tons.

The plan of quoting a delivered Detroit price \$4 a ton above the Pittsburgh base price, recently placed in effect on bars, may be extended to strip steel for the third quarter. If this step is not taken at this time, it will be because of the abnormally low quotations now current on strip.

An increase in the British tariff on steel, plus the advantage of sterling depreciation, will fail to shut out foreign steel. Continental semi-finished steel, with the new duties added, is still cheaper than English steel.

Zinc has declined to 2.60c., East St. Louis, a new all-time low price.

THE IRON AGE composite prices are unchanged, finished steel at 2.087c. a lb., pig iron at \$14.35 a ton and steel scrap at \$8.04 a ton.

▲ ▲ ▲ A Comparison of Prices ▲ ▲ ▲

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Apr. 26, 1932	Apr. 19, 1932	Mar. 29, 1932	Apr. 28, 1931
<i>Per Gross Ton:</i>				
No. 2 fdy., Philadelphia.....	\$15.59	\$15.59	\$15.59	\$17.76
No. 2, Valley furnace.....	15.00	15.00	15.00	17.00
No. 2 Southern, Ch'tl.....	13.82	13.82	13.82	14.19
No. 2, Birmingham.....	11.00	11.00	11.00	12.00
No. 2 foundry, Chicago*.....	16.00	16.00	16.00	17.50
Basic, del'd eastern Pa.....	16.00	16.00	16.00	17.00
Basic, Valley furnace.....	14.50	14.50	14.50	16.50
Valley Bessemer, del'd P'gh..	17.39	17.39	17.39	18.76
Malleable, Chicago*.....	16.00	16.00	16.50	17.50
Malleable, Valley.....	15.50	15.50	15.50	17.00
L. S. charcoal, Chicago.....	23.17	23.17	23.17	25.04
Ferromanganese, seab'd car- lots	\$75.00	\$75.00	\$75.00	80.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.
†Ferromanganese quotations adjusted to carload unit; larger quantities at discount.

Rails, Billets, etc.

<i>Per Gross Ton:</i>				
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	34.00	34.00	34.00	36.00
Re-rolling billets, Pittsburgh..	27.00	27.00	27.00	30.00
Sheet bars, Pittsburgh.....	26.00	26.00	26.00	30.00
Slabs, Pittsburgh.....	27.00	27.00	27.00	30.00
Forging billets, Pittsburgh....	33.00	33.00	33.00	36.00
Wire rods, Pittsburgh.....	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Skelp. grvd. steel, P'gh, lb....	1.50	1.50	1.50	1.65

Finished Steel

<i>Per Lb. to Larger Buyers:</i>	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.60	1.60	1.60	1.65
Bars, Chicago.....	1.70	1.70	1.70	1.75
Bars, Cleveland.....	1.65	1.65	1.65	1.70
Bars, New York.....	1.95	1.95	1.95	1.98
Tank plates, Pittsburgh.....	1.60	1.60	1.60	1.65
Tank plates, Chicago.....	1.70	1.70	1.70	1.75
Tank plates, New York.....	1.898	1.898	1.898	1.93
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.65
Structural shapes, Chicago....	1.70	1.70	1.70	1.75
Structural shapes, New York	1.86775	1.86775	1.86775	1.90 1/2
Cold-finished bars, Pittsburgh	2.00	2.00	2.00	2.10
Hot-rolled strips, Pittsburgh	1.40	1.40	1.40	1.55
Cold-rolled strips, Pittsburgh	2.00	2.00	2.00	2.15

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel

	Apr. 26, 1932	Apr. 19, 1932	Mar. 29, 1932	Apr. 28, 1931
<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.20	2.20	2.20	2.25
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.30	2.30	2.30	2.35
Sheets, galv., No. 24, P'gh...	2.85	2.85	2.85	2.80
Sheets, galv., No. 24, Chicago dist. mill.....	2.95	2.95	2.95	2.90
Hot-rolled sheets, No. 10, P'gh	1.55	1.55	1.55	1.70
Hot-rolled sheets, No. 10, Chi- cago dist. mill.....	1.65	1.65	1.65	1.80
Wire nails, Pittsburgh.....	1.95	1.95	1.95	1.90
Wire nails, Chicago dist. mill	2.00	2.00	2.00	1.95
Plain wire, Pittsburgh.....	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago dist. mill.....	2.65	2.65	2.65	2.60
Tin plate, 100-lb. box, P'gh..	\$4.75	\$4.75	\$4.75	\$5.00

Old Material

<i>Per Gross Ton:</i>				
Heavy melting steel, P'gh....	\$10.00	\$10.00	\$10.25	\$12.25
Heavy melting steel, Phila....	7.25	7.25	7.25	10.25
Heavy melting steel, Chicago	6.87 1/2	6.87 1/2	7.12 1/2	9.50
Carwheels, Chicago.....	7.00	7.00	7.00	9.50
Carwheels, Philadelphia.....	9.50	9.50	9.50	12.50
No. 1 cast, Pittsburgh.....	9.50	9.50	9.50	12.25
No. 1 cast, Philadelphia.....	9.00	9.00	9.50	11.50
No. 1 cast, Ch'go (net ton)...	7.00	7.00	7.00	9.00
No. 1 RR. wrot., Phila.....	8.50	8.50	8.50	11.00
No. 1 RR. wrot., Ch'go (net)	5.25	5.50	5.50	8.00

Coke, Connellsville

<i>Per Net Ton at Oven:</i>				
Furnace coke, prompt.....	\$2.25	\$2.25	\$2.25	\$2.50
Foundry coke, prompt.....	3.50	3.50	3.50	3.50

Metals

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Lake copper, New York.....	6.00	6.00	6.12 1/2	9.87 1/2
Electrolytic copper, refinery..	5.50	5.50	5.75	9.25
Tin (Straits), New York.....	19.65	19.00	21.20	23.75
Zinc, East St. Louis.....	2.60	2.75	2.77 1/2	3.40
Zinc, New York.....	2.97	3.12	3.14 1/2	3.75
Lead, St. Louis.....	2.90	2.90	2.90	3.90
Lead, New York.....	3.00	3.00	3.00	4.10
Antimony (Asiatic), N. Y....	5.35	5.87 1/2	6.12 1/2	6.85

▲ ▲ ▲ The Iron Age Composite Prices ▲ ▲ ▲

Finished Steel

April 26, 1932	2.087c. a Lb.
One week ago	2.087c.
One month ago	2.087c.
One year ago	2.128c.
Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.	
	<i>High Low</i>
1932	2.087c., Mar. 29; 2.037c., Jan. 19
1931	2.142c., Jan. 13; 2.052c., Dec. 29
1930	2.362c., Jan. 7; 2.121c., Dec. 9
1929	2.412c., April 2; 2.362c., Oct. 29
1928	2.391c., Dec. 11; 2.314c., Jan. 3
1927	2.453c., Jan. 4; 2.293c., Oct. 25
1926	2.453c., Jan. 5; 2.403c., May 18
1925	2.560c., Jan. 6; 2.396c., Aug. 18

Pig Iron

			\$14.35 a Gross Ton
			14.35
			14.43
			15.79
Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.			
HIGH		LOW	
\$14.81, Jan.	5;	\$14.35, Apr.	5
15.90, Jan.	6;	14.79, Dec.	15
18.21, Jan.	7;	15.90, Dec.	16
18.71, May	14;	18.21, Dec.	17
18.59, Nov.	27;	17.04, July	24
19.71, Jan.	4;	17.54, Nov.	1
21.54, Jan.	5;	19.46, July	13
22.50, Jan.	13;	18.96, July	7

Steel Scrap

\$8.04 a Gross Ton
8.04
8.21
10.67

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

High		Low	
\$8.50, Jan. 12;		\$8.04, Apr. 19	
11.33, Jan. 6;		8.50, Dec. 29	
15.00, Feb. 18;		11.25, Dec. 9	
17.58, Jan. 29;		14.08, Dec. 3	
16.50, Dec. 31;		13.08, July 2	
15.25, Jan. 11;		13.08, Nov. 22	
17.25, Jan. 5;		14.00, June 1	
20.83, Jan. 13;		15.08, May 5	

Pittsburgh Mills Benefit from Automotive Specifications

PITTSBURGH, April 26. — Increased releases from the automobile industry, continued improvement in inquiry for structural steel and reinforcing bars, and further maintenance of finished steel prices have helped to sustain the morale of the steel industry in this district, despite a lack of any gain in the aggregate operating rate. Pittsburgh district mills have shared in some of the orders placed recently by the Ford Motor Co. for sheets, strip steel and bars, and releases from other factors in this important industry have improved. Otherwise aggregate specifications for finished steel products have shown no change.

Orders for structural steel, reinforcing bars and other building products continue very light in spite of the accelerated volume of inquiry which is appearing. Some of the delay in placing business may be attributed to the firmer price structure which prevails on heavy steel products, but no weakness has appeared in the market as yet.

The larger structural fabricators in the district are now figuring on more than 200,000 tons of work, including 50,000 to 60,000 tons for penstocks for the Hoover Dam. While other Government work predominates in the market, the volume of inquiry from private sources is beginning to reflect the improved credit condition in the country.

Tin plate specifications have shown no further increase, but are well sustained at more than 50 per cent of capacity. Production is also holding at this level. Sheet mill schedules are slightly better this week, because of automotive releases, and the same can be said for strip steel. Railroad purchases are still negligible. The recent releases on track accessories seem to have contracted. No definite line pipe inquiry has appeared, but early action is expected on an 8400-ton export order in which Pittsburgh mills will share.

The ingot production rate in the Pittsburgh district is unchanged from last week, although output in the Valleys has risen to better than 25 per cent because of orders from the automobile industry and the release of some line pipe business. In the Wheeling district ingot schedules have risen a little to 40 per cent of capacity.

The pig iron market continues very

▲ ▲ ▲
Pittsburgh district ingot output is unchanged, but rate in Valleys is up to 25 per cent and Wheeling average is 40 per cent.

* * *
Fabricators are figuring on 200,000 tons of work, much of it for public undertakings.

* * *
Sheet mill schedules have been slightly improved by automotive releases.

* * *
Early action expected on 8400 tons of line pipe for export.

▼ ▼ ▼
dull and scrap is exceedingly weak in the absence of consumer purchases.

Pig Iron

Scarcely any new business is appearing, and occasional carload orders make very unimpressive totals. Shipments show no improvement; the April totals will fall under March. Prices are largely nominal, although current quotations are occasionally justified by small-lot sales.

Semi-Finished Steel

No change in demand is reported, and shipments this month are falling behind March levels with some sellers. Prices are maintained on such business as is being placed.

Rails and Track Accessories

The New York Central is still delaying allocation of its rail tonnage for the year, and has also scaled down its requirements to slightly less than 20,000 tons. No inquiry from the Pennsylvania has appeared, and it is reported that tonnage carried over from last year will be sufficient to meet this year's requirements. Specifications for track supplies have declined since the first of the month, but are still heavier than they were in January and February. There is practically no demand for light rails.

Bars, Plates and Shapes

Movement of heavy hot-rolled products has failed to show much improvement. Structural awards have been lighter in the past week, partly because of a firm price policy on the

part of mills. Nevertheless, inquiries are accumulating rapidly, the past week having added more than 100,000 tons to pending projects. Included is 50,000 to 60,000 tons for the penstocks of the Hoover Dam, on which bids will be taken June 15. Highway bridges in West Virginia will take 1700 tons. The larger fabricating shops in the district are still running at about 50 per cent, but some of the smaller companies have practically no business. Reinforcing bars are not particularly active for this season of the year, but highway work in this locality is bringing out some tonnage. Merchant bars are still very dull, and plate tonnage is lacking. However, several thousand tons of plates are involved in barge work, part of which is expected to be placed during the week. Prices seem to be well maintained at 1.60c., Pittsburgh, and the greater part of old tonnage taken at lower figures has now been shipped.

Cold Finished Steel Bars

Releases have taken a mild turn for the better, but are still very disappointing. Automobile tonnage is slow to come out, and most of the principal manufacturing consumers are confining their requirements to a minimum. The price is holding at 2c., Pittsburgh.

Tubular Goods

American makers expect to receive orders for 8400 tons of 10%-in. line pipe for export to the Irak Petroleum Corp., within the next fortnight. The business will probably be divided between two, and possibly among three, makers. No other active line pipe tonnage is in the market, and some projects which looked promising earlier in the year seem to have been definitely dropped. Standard pipe has shown a very mild gain this month, but awaits increased building activity for any substantial gains. Oil country goods are still quiet, but improvement seems definitely assured before the end of the quarter.

Wire Products

Demand is just about holding its own, current specifications amounting to 20 to 25 per cent of mill capacity. Merchant wire products are moving slightly better than manufacturers' material. Prices are holding at \$1.95 a keg, Pittsburgh, on nails, and 2.20c., Pittsburgh, on plain wire.

Sheets

The placing of May tonnage of the Ford Motor Co. has given the market

a brighter outlook, but aggregate specifications in the last week were light. No improvement is reported among other consuming industries whose requirements have been low for some time. Mill operations average about 25 per cent of capacity, being slightly in excess of last week. Prices are still holding. Some talk of an advance for third quarter is being heard. Hot-rolled annealed sheets are quoted at 2.20c., Pittsburgh; galvanized at 2.85c.; ordinary hot-rolled at 1.55c., and hot-rolled and annealed at 1.70c.

Tin Plate

Last week's gain in production and specifications has been maintained, but no further improvement is reported. Mills are still engaged at better than 50 per cent of capacity, and specifications exceed shipments with some producers. However, releases are being delayed by some of the larger canning companies until a better estimate of the vegetable pack is available.

Strip Steel

Local mills have benefited from the recent placing of Ford orders, but releases from other automobile companies show no change. Recent orders have not stimulated production very much, and the industry is still engaged at only about 20 per cent of capacity. Hot-rolled strip is relatively more active than the cold-rolled grade, and there is a fair movement of corrosion-resisting material. Prices show no change and are unusually well held considering the minimum of new buying which has characterized activity in the last two or three weeks.

Coke and Coal

Movement of coke to foundries and furnaces has failed to show any improvement, and April will be one of the duller months in the industry's history. The coal market is also inactive, although a shortage of steam slack has developed because of labor difficulties in Ohio, and the price has risen accordingly. Slack is now quoted at 75c. to 90c. a ton.

Old Material

In the continued absence of consumer buying, the scrap market is in a critical condition, with quotations on the leading grades entirely nominal. Dealers have practically run out of orders and are unable to make purchases to establish market quotations. Holdups are in effect at several consuming points, and both heavy melting steel and hydraulic compressed sheets are occasionally offered to mills at distress prices. Nevertheless the failure of buyers to be tempted by such figures has prevented the market from sinking to definitely lower levels. In the meantime purchases by a large consumer are still in prospect, and such buying would save the market from a rather sharp drop. No

movement of blast furnace material is reported, as consumers are doing their best to maintain ore consumption. Foundry grades are also quiet. The Pennsylvania Railroad list closing on May 4 contains 21,300 tons of scrap, including 3650 tons of No. 1 heavy melting steel and 2500 tons of rails.

Sheet Demand Improves Slowly at Cincinnati

CINCINNATI, April 26.—Continued sluggishness of business is reflected in a slight reduction of the pig iron melt. Several foundries that had been operating four days a week have reduced to two days. Pig iron demand is at a low level, bookings in the past week having totaled about 700 tons. Consumers are keeping inventories low and taking material only as urgently needed. Shipments against contract are at steady low rate, but are, for the most part, behind contract stipulations. Prices are unchanged.

Foundry coke shipments continue at slow rate in keeping with the low melt. Prices for May on by-product foundry remain at about \$9.05, delivered in Cincinnati.

Sheet demand shows moderate improvement. April business has sustained production at close to 40 per cent of capacity, despite a small automotive demand. Sheet makers feel that the second quarter will bring a gradual upturn in bookings.

Scrap sales are small and at "bargain" prices. Shipments continue to be retarded.

Scrap Shows Further Weakness at St. Louis

ST. LOUIS, April 26.—Within the last week there has been a marked increase in the number of orders for pig iron, but they are almost entirely for carloads and for quick shipment. The situation seems to be that smaller melters are doing some business, and are buying pig iron as they require it. Larger melters show little interest in buying.

Only one of the 28 open-hearth furnaces in the district is in operation. One plant will resume operation of two furnaces within the next two weeks.

Bids will be opened on May 10 for a settling basin for the Howard's Bend plant of the St. Louis Waterworks, requiring 1125 tons of reinforcing bars and 502 tons of sheet piling.

Five of the seven major structural fabricating plants are closed and two are operating at about 20 per cent of capacity, the lowest point yet reached by this industry.

Mills report some buying of struc-

tural shapes, but mostly for small-size projects.

Scrap dealers are without orders, and mills in the district have not indicated when they will come into the market. Railroad lists are light, especially local lines, whose retrenchment policies have affected reclamation plants and shop work. Selected and No. 2 heavy melting steel each are off 25c. a ton, in line with the Chicago market, and No. 1 busheling and rails for rolling are each 50c. lower. Railroad lists: Union Pacific, 1200 tons; Mobile & Ohio, 120 tons; Nashville, Chattanooga & St. Louis, 110 carloads, and New York, Chicago & St. Louis, nine carloads.

Slight Gain in Cast Pipe Business at Birmingham

BIRMINGHAM, April 26.—The pig iron market still shows no signs of improvement. Buying remains almost on a daily spot basis, with melters ordering iron only for immediate actual requirements. The price of \$11 for the Southern market is being maintained. Foundry operations are irregular and schedules are dependent on current bookings. Pipe business shows slight improvement, but is far from what the spring season should bring. Los Angeles has divided 5000 tons of pipe among four local plants. Other orders have not exceeded a few hundred tons.

When the Tennessee company blew in the three Ensley stacks, blast furnace activities returned to the February level. Seven furnaces are in operation, three being on basic iron, three on foundry and one on recarburizing iron. The Republic Steel Corp. is planning to change its furnace this week from foundry iron to special grades of high-manganese and high-silicon iron.

New steel tonnage is mostly made up of scattered routine business, with the volume close to that of recent weeks. Buying in some lines is becoming more restricted. Prices are firm. Nine open-hearth units were active last week, all being of the Tennessee company. Gulf States Steel did not operate its open-hearth plant. Most of its finishing mills were also down. Fabricators continue to report a scarcity of new tonnage.

Old Material

Scrap remains at a standstill.

Production of galvanized pails and tubs in February rose to 110,474 doz. from 87,096 doz. in January, according to reports received from 13 establishments by the Bureau of Census. The output of other galvanized ware increased to 21,472 doz. from 13,612 doz. Production of enameled sheet metal ware increased to 270,198 doz. from 198,878 doz., according to reports received from 15 manufacturers.

Chicago Steel Output Rises Slightly as Small Orders Accumulate

CHICAGO, April 26.—New rail purchases and inquiries, together with the placing of fabricated material by the Union Pacific, have given a note of encouragement to an otherwise drab iron and steel market. Ingot output, which had sagged close to the 20 per cent mark, has gained to the extent of three open-hearths. This is not so significant as might be expected, because some producers are permitting orders to accumulate before altering output. How long this practice can continue is uncertain because, with steel prices well stabilized, more tonnage each day is being sold on the basis of delivery. Users want prompt delivery in most cases and they will spread small lots in several directions to match with rolling schedules or to draw a few pieces of steel from an over-rolling.

A cargo of steel is due at Chicago this week from Buffalo. The boat will return to Lake Erie loaded with cast iron borings.

Business placed in this district by automobile manufacturers remains small, though all told there is a slight increase, with the promise of more to come in the near future. Sales of finished steel have been exceeded by only one week so far this year. Specifications have not climbed above the recent average.

Public building work is more active, registering increases both in new contracts and fresh inquiries.

The Joliet blast furnace has been blown out, leaving eight active steel works blast furnaces out of 36 in the district.

Pig Iron

The Northern foundry iron market is steady, with one hopeful sign, i.e., that non-integrated steel mills will soon take tonnages again. Prices are gaining strength at \$16 a ton, furnace. Ford is reported to have placed 700 tons of spiegeleisen. He is now in the market for 700 tons of ferromanganese.

Rails and Track Supplies

Chicago steel mills have taken orders for about 4000 tons of rails, most of which were placed by one railroad. Fresh inquiries total 10,000 tons. Releases have been coming in fast enough to hold output steady and new business promises to extend this rate a few weeks longer. The Great North-

District steel plants add three open-hearth furnaces to take care of accumulated orders.

Union Pacific places 2600 tons of bridge work.

Rail orders and releases are sufficient to maintain present rail production.

Joliet stack blown out, leaving only eight district steel works blast furnaces active.

ern has ordered tie plates from the Colorado company, while Chicago railroads have ordered out 3000 tons of track accessories. The character of track work being done this spring is clearly indicated by the greater proportion of accessories being placed as compared with rails.

Plates

This market remains dormant, and unfortunately there are no projects that would tend to improve the situation. Tank makers throughout the Middle West are hungry for work and there is none of size in sight. The only active railroad equipment inquiry is from the Union Tank Car Co., and calls for only five to ten tank cars. Local pipe mills are practically idle, with the bulk of shipments being made from stock. Prices are steady.

Structural Material

This market is showing up somewhat better, with lettings over the 4000-ton mark and fresh inquiries totaling close to 7500 tons. Awards are well scattered and many of them are being taken by outlying fabricators. About 1300 tons of the Union Pacific work will be fabricated at the Gary shops of the American Bridge Co. Noteworthy among inquiries is 4000 tons for bulkheads and gates at the Hoover Dam.

Cast Iron Pipe

On the surface this commodity appears more active, but there is little in sight that points to sustained demand. Moline, Ill., has let the general

contract for a water plant, but Wilmette, Ill., is temporarily blocked from a similar move because of its inability to dispose of bonds. Elgin, Ill., is planning a small sewage treating plant. Oshkosh, Wis., and several small cities in Ohio have ordered small tonnages.

Reinforcing Bars

The effect of a 600-ton job on prices in a dull market is clearly shown by low quotations made on the Detroit post office. Local work is scarce and real tests are not to be had. Shipments for road work are gaining slowly. They should be much heavier by this time, but many contracts remain unsigned. The State of Illinois will open bids April 26 on bridges requiring 150 tons and also some pavement.

Bolts, Nuts and Rivets

Orders are more numerous, but the aggregate tonnage shows very little increase. Inquiries are light.

Wire Products

April shipments are very close to the March rate, and producers have about given up hope of even a suggestion of a spring buying movement. Output is between 20 and 25 per cent of capacity. Prices are steady and some thought is being given to third quarter quotations, which may come out somewhat earlier than usual. The copper wire market is extremely dull.

Bars

Automobile manufacturers' requirements are resulting in slightly heavier specifications and some road machinery builders have better operating schedules. There is no marked change in demand from miscellaneous users.

Sheets

Demand is spotty, but on the whole slightly heavier than earlier in the month. Jobbers are finding need for small additional tonnages, and the roofing business is a little more lively.

Old Material

The scrap market is sagging under its own weight. Dealers are offering heavy melting steel at \$6.75 a gross ton, delivered, and find no takers. Hydraulic bundles, of a mixed grade, have been sold at \$5.75 a ton, and borings are being traded in at about \$3.50.

Difficulty in Financing Hurts Eastern Pennsylvania Trade

Railroads Defer Buying Despite Wear and Tear—Steel Orders Placed by Telegraph

PHILADELPHIA, April 26.—No large tonnages for steel mills in the near future are disclosed by a survey of the market outlook. Some producers reflect a growing belief that no sharp improvement may be expected over the remainder of the year.

This view is based partially on the continuing absence of important tonnage placements by the railroads and the automotive industry. On the other hand, railroads concede that during the long period of deferred buying rolling stock and equipment have become badly worn and are in urgent need of replacement. The problem of the railroads is the common current general problem of financing. Yet it is contended that the natural law of wear and tear will force railroad buying sooner or later on a sizable scale. Some railroad interests claim they do not see prospects of early purchases and deny reports that heavy tonnages are planned for June.

Virtually no business is being received by mills from the automotive trade. However, one body builder, which does work for the Ford Motor Co., as well as other car makers, has increased operations. Another body builder has reopened its plant and is working at a limited rate on contracts covering two makers of middle-priced cars.

Mill operations remain unchanged at about 15 per cent of capacity.

Pig Iron

The market is particularly dull. It is probable that new inquiries the past week have not exceeded three carloads. The low prices at which foreign iron is being laid down are a disturbing factor.

Plates, Shapes and Bars

Mills report that orders the past week have shown a slight drop under those of the previous week. The new price level, however, is said to be holding well on the small inquiries and bookings. Significant of the absence of stocks of some consumers is the fact that one plate maker reports that 50 per cent of the orders received are placed by telephone or telegraph with a corresponding decrease of new business coming by mail. It is the opinion that these buyers of plate by telephone or telegraph have taken contracts on short notice which require early delivery. This development is taken to be a hopeful sign that when business turns for the

better orders will be numerous and will call for quick rolling.

Sheets

Mills in this district have received no orders the past week from the automotive trade. New business placed involves only light lots.

Imports

Imports last week included 3760 tons of pig iron from England and

100 tons from British India, and 4 tons of bearing tubing from Sweden.

Warehousing Business

Demand is extremely light. Prices are unchanged.

Old Material

Several grades have declined 50c. the past week. The market generally is nominal and it is difficult to discover actual offerings or transactions on which to base prices. While No. 2 heavy melting steel is down 50c., the market for No. 1 heavy melting steel continues to be quoted at \$7 to \$7.50, but perhaps is weak at this range. This is based on prices paid by dealers and those they ask. The largest known sale of about one month ago commanded \$7.50, though it is reported scattering tonnages have been offered for less.

New England Foundry Coke Reduced 50c. a Ton

BOSTON, April 26.—The pig iron business is almost at a standstill. Most local furnace representatives did not make a sale the past week, and bookings by the Mystic Iron Works were very largely confined to truckloads for prompt delivery. A New York report of a 1500-ton inquiry in this market cannot be confirmed here. A small tonnage of Indian iron is due early next month. Most of the Dutch iron landed at Providence, R. I., many weeks ago is still unsold.

The New England Coal & Coke Co. and the Providence Gas Co. have reduced by-product foundry coke 50c. a ton, making the delivered price at most New England points \$10.

Most scrap brokers are doing absolutely nothing, and the others are doing very little. Sales are confined almost exclusively to small tonnages of No. 1 heavy melting steel, bundled skeleton, textile cast, and occasionally a car of No. 2 steel and engine blocks. Because of slack industrial conditions little scrap is being made.

Sales of steel sheet piling manufactured by the Bethlehem Steel Co. will be handled, beginning May 1, by the Kalman Steel Corp., a Bethlehem subsidiary. Kalman Steel Corp. will also engage in the repurchase and resale of used steel sheet piling. The Pacific Coast Steel Corp. will handle this product in like manner on the Pacific Coast. The product, which has been designated as Lackawanna piling, will hereafter be known as Bethlehem piling.

Buffalo Iron and Steel Trade Unimproved

BUFFALO, April 26.—The largest single tonnage of pig iron that has been placed in this district recently was 300 tons of foundry for the Westinghouse Electric & Mfg. Co. This order was split among three or four producers. Releases of ferro-Bessemer show some improvement, but the general schedule of shipments for merchant iron so far this month has not been encouraging.

Steel output remains practically unchanged, the Lackawanna plant of the Bethlehem Steel Corp. having nine furnaces active. The Republic Steel Corp. discontinued its four furnaces last week until the latter part of this week, when operation will be resumed. The Seneca Iron & Steel Co. is operating at 25 to 30 per cent of capacity. The principal structural letting of the week was a 200-ton job for a bridge for the State of New York at Queens, N. Y. Some increased sheet tonnage has come from the automotive industry, but no considerable volume as yet.

The scrap market is quiet and prices quoted are nominal. A leading mill, which has been out of the market for some time, could unquestionably buy all the No. 1 steel it wanted at \$7. One lot of 2000 tons at this price was turned down.

A comprehensive survey of the uses of manganese in the steel industry is being made by the metallurgical section of the Pittsburgh Experiment Station of the United States Bureau of Mines. This will appear as one part of a monograph on manganese which is being written in the metallurgical division.

Cleveland Ingot Production Rises to 26 Per Cent

Automotive Releases of Sheets, Strip Steel and Castings Provide
Encouragement in Otherwise Dull Market

CLEVELAND, April 26.—Steel production has been stimulated by orders for sheets and strip steel placed by the Ford Motor Co. during the week with Cleveland and Valley district mills. One Cleveland plant supplying the motor car industry has put two open-hearth furnaces back in operation, increasing the ingot production of local mills to 26 per cent of ingot capacity. A Cleveland stamping plant has secured new releases for running boards for 30,000 Ford cars and a local foundry is getting under production on malleable iron brake drums for the Ford company. With these exceptions, little Ford business has come to parts makers in this territory.

With the opening of Lake navigation, a moderate tonnage of steel is starting to move to Detroit by water from various shipping ports. Included in the water shipments is some steel from the Wheeling district which is going by the rail-water route.

Consuming industries outside of the motor car field do not show an increase in activities. Railroad buying is virtually at a standstill. The recent inquiry from the Wheeling & Lake Erie for gondola cars is still pending, and it is stated that the company has definitely decided to purchase 50 of these cars.

Prices generally are firm. The situation in respect to sheet prices doubtless will be strengthened by the cleaning up of shipments this week against releases on first quarter contracts at lower prices than are now prevailing.

Pig Iron

Some of the foundries making parts for the Ford Motor Co. have received new releases from that company for castings and have increased their shipping orders for pig iron during the week. There is not much new business, although one interest took several orders aggregating 3000 tons. Shipping orders have gained considerably this month with some furnaces, but with others have not run ahead of March. Prices are steady at \$15.50, local furnace, for foundry and malleable iron for Cleveland delivery and \$15 for nearby shipment. For competitive points lower prices prevail.

Iron Ore

Railroad executives have made a tentative decision not to apply a surcharge on Lake Superior iron ore shipments from Lake Erie ports to in-

land furnaces except on ore now in dock piles. Northern railroads will collect the surcharge amounting to 6.72c. per gross ton on shipments from the mines to the upper Lake ports, which is paid by the producers.

Sheets

A Cleveland stamping plant Monday was given a release by the Ford Motor Co. of 60,000 running boards for 30,000 cars. The steel, which is purchased by the fabricator, will be supplied by a Cleveland mill. Aside from sizable orders placed by the Ford company with mills in this territory the market was dull during the past week. Enameling stock is still moving in fair volume to electrical refrigerator manufacturers. The metal furniture industry shows no life. As some consumers are still getting shipments of hot-rolled annealed sheets against first quarter contracts at 2.05c., producers are finding it difficult to take much business at the present price of 2.20c. However, April 30 is the dead line for shipments of sheets carried over from the first quarter.

Strip Steel

New business continues light in both hot and cold-rolled strip. Some of the motor car accessory manufacturers have increased operations, but previously had issued releases to cover their early requirements. Prices are firm at 1.40c., Pittsburgh, for

wide and 1.50c. for narrow for large buyers, and 2c., Cleveland, for cold-rolled material.

Bolts and Nuts

Leading bolt and nut manufacturers have announced a revision of prices on stove bolts and a new method of differentiating between bulk and package prices. Instead of a 2½ per cent extra discount formerly allowed for bulk orders, separate discounts are now provided for package and bulk orders. The new bulk discount is 86 per cent, which is a slight advance and the package discount is 77½, 25 and 10 per cent, or about 12 per cent higher than the bulk price. The bulk price will apply to lots of 5000 or more of a size.

Bars, Plates and Shapes

Bars continue to move in small volume. Local forge shops are getting little business from the motor car industry. With a large amount of public building and bridge work in prospect, the outlook in the structural field is more promising, although inquiry is still scarce. The only sizable award in this territory during the week was 240 tons for the Canton Post Office. Demand for plates for small tank work has become somewhat more active. A Lake shipyard is figuring on a boat requiring 2000 tons of steel. Prices are steady at 1.65c., Cleveland, for bars and 1.60c., Pittsburgh, for plates and shapes. Billet steel reinforcing bars appear firm at 1.50c., Cleveland.

Old Material

Two Valley district mills this week released shipments of lighter grades of steel-making scrap and a Cleveland mill resumed accepting shipments after a week's suspension. There is no new demand. Prices are unchanged.

Foreign-Made Concrete Bars Must Be Marked to Indicate Their Origin

WASHINGTON, April 26.—Efforts of the Concrete Reinforcing Steel Institute to compel imported reinforcing bars to be marked as required under Section 304 of the tariff act have been successful.

Commissioner of Customs F. X. A. Eble has issued a Treasury decision requiring that the bars be marked. The decision pointed out: "It appears that concrete reinforcement bars are capable of permanent marking at the time of their manufacture by having the mark of origin rolled into the bars. Domestic bars usually bear initials or other identifying marks or designs which are rolled into the articles during the process of manufacture. Although it is understood that a large percentage of foreign-made bars do bear certain

marks, such marks do not serve to identify the bars as foreign-made products. These markings on domestic and foreign-made bars indicate the practicableness of marking such articles to indicate the country of origin under section 304 of the act.

"The bureau (of customs) has reached the conclusion, therefore, and it so holds, that concrete reinforcement bars should be required to be marked to indicate the country of origin, such marking to be as permanent as the nature of the articles will permit."

The decision points out that inasmuch as a change of practice is involved, it will only be applied to merchandise which is imported after the expiration of 60 days following the date of publication, which was April 18.

Prospective Structural Work Looms Large in the East

Upward of 100,000 Tons of Fabricated Steel Projects Will Soon Be Awarded—Ford Inquiring for Ferroalloys

NEW YORK, April 26.—Most of the steel companies report a decline in business in this territory. One of the larger independents had the poorest week since it has maintained a New York sales office. Aside from structural steel, there is no important business pending. Upward of 100,000 tons of fabricated steel for buildings probably will be awarded in May. This figure is for the entire country, but much of the prospective business is in the East, and nearly all of it is public work. A new project is grade elimination work for the Long Island Railroad at Valley Stream, L. I., which calls for 12,900 tons of shapes and 1000 tons of bars.

There are no new developments in the price situation. Quotations are firm on virtually all products with the possible exception of plates, but there is very little test. Most of the plate mills are holding at 1.70c., Coatesville, but this figure has been shaded on a few transactions.

Pig Iron

Sales in the past week totaled 2500 tons, compared with 2000 tons in the preceding week and 1500 tons two weeks ago. Aside from 1000 tons placed by the Foran Foundry & Mfg. Co., Flemington, N. J., orders for the week were individually small.

Ferroalloys

The Ford Motor Co. has closed for 700 tons of 26 to 28 per cent spiegel-eisen and is inquiring for 200 tons of 50 per cent ferrosilicon, 500 tons of high-carbon ferrochrome and 700 tons of 80 per cent ferromanganese, all for May-June shipment.

Coke

The Seaboard By-Product Coke Co., Kearny, N. J., has reduced its price on foundry coke 35c. a ton to \$7.65, ovens.

Fabricated Structural Steel

NEW inquiries of 35,650 tons compare with 8050 tons a week ago and 39,750 tons the week of April 14, which was the largest total for any corresponding period this year. The outstanding projects are in the East, where between 10,000 and 18,000 tons will be required for a post office and treasury building in Philadelphia and 12,900 tons for grade elimination at Valley Stream, N. Y., for the Long Island Railroad. Bookings total 10,340 tons, of which 2600 tons is for bridges for the Union Pacific Railroad. Bridge awards again account for the bulk of lettings, calling for 5260 tons. Lettings follow:

NORTH ATLANTIC STATES

Boston, 500 tons, Latin School, to Boston Structural Steel Co., Inc.
Passaic, N. J., 700 tons, two boiler houses for Forstman Woolen Co., to Lackawanna Steel Construction Corpn.
Albany, N. Y., 100 tons, additional steel for Albany Port Authority project, to Lackawanna Steel Construction Corpn.
New York, 200 tons, Grand Central Parkway bridge in Queens, to Lackawanna Steel Construction Corpn.
Muncy, Pa., 320 tons, bridge for Reading Railroad, to McClintic-Marshall Corpn.

THE SOUTHWEST

Coal County, Okla., 190 tons, bridge, to Muskogee Iron Works.

CENTRAL STATES

Canton, Ohio, 240 tons, post office, to McClintic-Marshall Corpn.
Whiting, Ind., 200 tons, power platform for M. W. Kellogg Co., to Mississippi Valley Structural Steel Co.
Marseilles, Ill., 1100 tons, locks, to McClintic-Marshall Corpn.
Rockford, Ill., 690 tons, post office, to unnamed bidder.
Chicago, 180 tons, Sixteenth Street bridge, to Gage Structural Steel Co.

Wood River, Ill., 160 tons, scaffolding for Standard Oil Co., to Hansell-Elcock Foundry Co.

St. Clair County, Mo., 270 tons, highway construction work for Missouri State Highway Commission, to St. Joseph Structural Steel Co.

South McCook, Neb., 287 tons, highway bridge, to St. Joseph Structural Steel Co.

Adams County, Iowa, 105 tons, bridge, to Pittsburgh-Des Moines Steel Co.

Case County, Iowa, 400 tons, bridge, to Pittsburgh-Des Moines Steel Co.

State of Minnesota, 144 tons, highway bridges, to American Bridge Co. and McClintic-Marshall Co.

State of North Dakota, 205 tons, highway bridge, to Illinois Steel Bridge Co.

Pocatello, Idaho, 106 tons, post office, to Pittsburgh-Des Moines Steel Co.

Geyserville, Cal., 350 tons, Russian River bridge, to Columbia Steel Co.

Union Pacific Railroad, 2600 tons, bridges divided equally between American Bridge Co. and Consolidated Steel Corpn.

Adna, Wash., 200 tons, County bridge over Chehalis River, to Pacific Car & Foundry Co.

WESTERN STATES

Sacramento, 1100 tons, post office, to Judson, Pacific Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Norwich, Conn., 125 tons, academy.
Stockbridge, Mass., 600 tons, hotel.
Valley Stream, N. Y., 12,900 tons, grade separation for Long Island Railroad.
New York, 600 tons, St. John's freight terminal.
State of New York, 200 tons, two highway bridges.
Newark, N. J., 5500 tons, post office; previous bids rejected, new bids to be taken May 4.
Paterson, N. J., 800 tons, post office; bids to be opened May 23.
Philadelphia, 10,000 to 18,000 tons, estimated, post office and treasury building.
Baltimore, 2000 tons, South River bridge for State Highway Commission; Empire Construction Co., Baltimore, low bidder on general contract.
Washington, 9500 tons, Postoffice Department building; bids to be opened May 23. Reported last week as addition to post office.

SOUTH AND SOUTHWEST

State of West Virginia, 1200 tons, several highway bridges.
Wyoming and Mingo Counties, W. Va., 500 tons, two County highway bridges.
State of Oklahoma, 400 tons, highway bridges.

CENTRAL STATES

Fort Wayne, Ind., 500 tons, boiler house.
Manistee, Mich., 850 tons, highway bridge.
Chicago, 625 tons, World's Fair exhibit building for General Motors Corpn.
Chicago, 500 tons, agricultural building for World's Fair.
State of Illinois, 500 tons, highway bridges.
Superior, Wis., 120 tons, addition to school library.
Crookston, Minn., 570 tons, highway bridge.
St. Louis, 502 tons, sheet piling for Howard's Bend plant of St. Louis waterworks.

WESTERN STATES

Hollywood, 500 tons, Kress building; bids closed April 27.
State of Washington, 450 tons, highway bridge over Skykomish River.
Pomona, Cal., 175 tons, grandstand for county fair grounds, McClintic-Marshall Corpn., low bidder.
Snohomish County, Wash., 900 tons, Stillaguamish River State highway bridge near East Stanwood; bids close May 20.
Monterey, Cal., 100 tons, post office.

CANADA

Vancouver, B. C., 150 tons, pipes, fittings and valves for First Narrows tunnel; bids close May 27.

FABRICATED PLATE

Houston, Tex., 175 tons for Gulf Coast Pipe Line Co., to Wyatt Metal & Boiler Co.
Chehalis, Wash., 200 tons, standpipe, to Commercial Boiler Works.
Yakima, Wash., 182 tons, penstock for Wippel pumping plant, to Beall Tank & Pipe Co.

NEW PROJECTS

Passaic, N. J., 3500 tons, plates for steel pipe; Thomas Burk, Philadelphia, and Lock Joint Pipe Co., Ampere, N. J., low bidders on general contract.
Hoover Dam, 50,000 tons of plate steel pipe; Bureau of Reclamation, Denver, opens bids June 16.

Pipe Lines

Syracuse Lighting Co., Syracuse, N. Y., a unit of Niagara-Hudson Power Corpn., has plans for a natural gas pipe line from Baldwinsville to Fulton, N. Y. Cost over \$150,000.

Water Bureau, Seattle, A. F. Marion, superintendent, has plans for replacement of Cedar River pipe lines Nos. 1 and 2, from Lake Youngs to water tunnel under Landsburg, with alternate proposals to be asked on steel pipe, creosoted wood and concrete pipe. Cost about \$600,000. D. W. McMorris, City-County Building, is city engineer.

Santa Maria Gas Co., Santa Maria, Cal., plans installation of 8-in. welded steel pipe line for high-pressure natural gas service from Santa Maria River to Pismo Beach and vicinity, about 21 miles. Pipe will be secured through Southern Cities Gas Co., 810 South Flower Street, Los Angeles. Cost about \$200,000.

Steel Corporation Loss Heavy; Common Dividend Omitted

Operating Deficit of \$1,136,607 Sustained in First Quarter Against
Operating Profit of \$3,970,920 in Fourth Quarter

DIRECTORS of the United States Steel Corp., at their meeting on Tuesday, passed the dividend on the common stock, but declared the regular quarterly dividend of 1% per cent on preferred stock. A brief announcement stated that the common dividend was omitted because of "reduced earnings for the quarter."

The corporation reported an operating deficit of \$1,136,607 for the first quarter against an operating profit of \$3,970,920 in the fourth quarter of 1931. Thus, its first quarter income was poorer by \$5,107,527 than that of the fourth quarter. With charges for depreciation, depletion and obsoles-

cence, amounting to \$10,740,321, the total deficit for the quarter before interest or dividend charges was \$11,876,928. Bond interest of \$1,341,621 and preferred stock dividends of \$6,304,919 bring the total of deficit to be provided from undivided surplus to \$19,523,468 for the three months.

In the fourth quarter the charges for depreciation, depletion and obsolescence amounted to \$11,988,190 against \$10,740,321 in the past quarter.

With the first quarter report, the corporation has discontinued the reporting of income by months. In the fourth quarter there was an operating loss only in December.

Large Amount of Fabricated Structural Steel Work Is Pending on Pacific Coast

SAN FRANCISCO, April 26.—Projects involving tonnages running into four, five and six figures for award during the next few months have occupied the attention of Pacific Coast structural steel suppliers during the past week. Among them is the San Francisco Trans-Bay bridge, which will take upward of 150,000 tons of steel. This \$75,000,000 project will be constructed with a State highway bond issue. Engineers approved the design during the past week. Bids will probably be called in the late fall, or in early spring of 1933. This is separate from the \$35,000,000 Golden Gate bridge, involving 100,000 tons, for which contracts are delayed by litigation.

The United States Bureau of Reclamation has called for bids at Denver on May 2 for approximately 2500 tons of bulkheads, gates and hoists, covered by specification No. 533. On June 15 bids open on three alternate specifications, involving 52,000 to 60,000 tons for plate steel outlet pipes.

The general contract for the El Capitan dam, San Diego, Cal., has been let for \$2,332,800. The project involves 1500 tons of shapes and bars, and 400 tons of cast iron pipe. Construction will start immediately.

For a waterfront development at Stockton, Cal., the general contract has been awarded and sub-contracts are expected for 1500 tons of bars, shapes and rails during the coming week.

For the Pine Canyon dam, Pasadena, Cal., the general contract has been awarded for \$2,407,311, requiring 1500 tons of reinforcing bars. Over 2500 tons are also involved in highway bridges in California, Oregon and Washington on which definite calls for bids have been set.

During the past week awards included 2000 tons of shapes and 5000 tons of cast iron pipe for Los Angeles.

Reinforcing Steel

Awards 2950 Tons—New Projects
3925 Tons

AWARDS

Newark, N. J., 100 tons, municipal sewer, to Truscon Steel Co.

Mitchel Field, L. I., 160 tons, for uncompleted barracks, to Concrete Steel Co.

Philadelphia, 240 tons, Benjamin Franklin Memorial, to Taylor-Davis Co., Philadelphia.

Grand Rapids, Mich., 400 tons, municipal auditorium, to McRae Steel Co., Detroit.

Detroit, 600 tons, post office, to Kalman Steel Co.

Marseilles, Ill., 100 tons, locks and dam, to an unnamed bidder.

Davenport, Iowa, 105 tons, post office, to an unnamed bidder.

Texarkana, Ark., 250 tons, post office, to Laclede Steel Co.

Chippewa Falls, Wis., 400 tons, bridge, to an unnamed bidder.

State of Illinois, 200 tons, roadwork, to Olney J. Dean & Co.

Gladstone, Ore., 179 tons, Clackamas River bridge, to Mercer Steel Co.

Arcata, Cal., 200 tons, building for State Teachers College, to Truscon Steel Co.

NEW REINFORCING BAR PROJECTS

Valley Stream, N. Y., 1000 tons, grade separation work for Long Island Railroad.

Washington, 125 tons of wire mesh for paving work on Fourteenth Street and Reservoir Road; Union Paving Co., Philadelphia, contractor.

Moline, Ill., 425 tons, waterworks, Central Engineering Co., Davenport, Iowa, general contractor.

Meridian, Miss., 150 tons, post office.

Snohomish County, Wash., Stillaguamish River bridge, 800 tons.

Waukegan, Ill., 125 tons, post office.

Danville, Ill., 300 tons, Veterans' Hospital.

Chicago, 150 tons, General Motors exhibit building for World's Fair.

State of Illinois, 150 tons, bridges.

St. Louis, 1125 tons, settling basin for Howard's Bend plant of St. Louis waterworks.

Cast Iron Pipe

Troy, Ohio, has ordered 175 tons from R. D. Wood & Co. and Central Foundry Co.

Bethel, Ohio, has awarded 330 tons to Central Foundry Co.

Elgin, Ill., will buy a small tonnage for a sewage disposal plant.

Moline, Ill., has placed general contract for water treating plant with Central Engineering Co., Davenport, Iowa.

Oshkosh, Wis., placed 4308 lin. ft. of 6-in. class C with Glamorgan Pipe & Foundry Co.

St. Louis, awarded 200 tons of 8 and 10-in. to American Cast Iron Pipe Co.

Los Angeles awarded about 5000 tons for city water department requirements as follows: United States Pipe & Foundry Co., 2540 tons of 8- and 12-in. (\$73,410); American Cast Iron Pipe Co., 1160 tons of 8- and 12-in. (\$33,450); National Cast Iron Pipe Co., 775 tons of 8-in. (\$23,050); Pacific States Cast Iron Pipe Co., 550 tons of 8-in. (\$16,480).

Colfax, Wash., will open bids May 2 for 128 tons of 6- and 8-in.

Victorville, Cal., is planning to sell \$50,000 in bonds to finance a new water system involving over 600 tons, to include 37,000 ft. of 4- and 6-in.

Detroit Scrap Prices Off

DETROIT, April 26.—In sympathy with weakness in the Pittsburgh market local scrap prices declined 25c. to 50c. a ton the past week, practically every item being affected. Heavy melting steel and hydraulic bundles, off 50c. each, led the downward movement. Increased automobile output in the next few weeks, with greater scrap production, is expected to depress prices further in view of the large stocks already on hand. The boatload of scrap erroneously reported last week as destined for Youngstown via Cleveland was shipped to Buffalo and was one of the largest single tonnages ever sent out of Detroit by water.

American Nickeloid Co., Peru, Ill., manufacturer of nickel zinc, chrome zinc, nickel steel, chrome steel, and other alloy products, has published a small booklet commemorating 34 years in business.

Copper Remains Dull; Tin Slightly Firmer; Lead Sales Gain; Zinc Price Lower

NEW YORK, April 26.—The inclusion of a customs duty of 5c. per lb. on copper in the Senate tax bill gave no fillip to the copper market. Demand has remained extremely dull and prices are unchanged. If the Senate provision were adopted without change, it would probably mean a 9c. or 10c. copper market here, but the public has learned not to count too confidently on what Congress may do; hence, consumers probably will postpone speculative purchases until there is a more definite assurance that a copper duty will remain in the bill as finally adopted. There is sure to be objection to this duty and others on coal and oil on the floor of the House and Senate. Primary producers still cling to a nominal quotation of 6c., delivered, but sales are being made by custom smelters at 5.75c. A similar situation prevails in the export market, where 6.25c. is the nominal price, with special offers being made at 6c.

Tin

The tin market during the week was under the influence of the International Tin Committee meeting in Paris

on April 22, which resulted in an agreement to make a further curtailment in production of 20,000 tons, effective June 1. Prior to this meeting there was a natural reluctance among sellers to offer tin, while buyers were equally backward in making commitments. As a result, the week was one of very little activity. On two or three days there were no sellers and no buyers. After the curtailment program was announced, the London market advanced, but the effect on the New York market was very slight. Warehouse stocks at London on Saturday were 33,001 tons, a gain of 234 tons during the week, notwithstanding a shipment of 250 tons to the United States. Shipments from the Far East up to April 21 were 3902 tons. London prices today were £116 5s. for spot standard, £118 5s. for future standard and £120 5s. for spot Straits. The Singapore price was £120 10s.

Lead

Sellers of lead experienced one of the best weeks in some time. Total sales were more than 4000 tons. This business was done at steady and un-

changed prices, which are 2.90c. a lb., St. Louis, and 3c., New York.

Zinc

Further weakness has developed in zinc, the total decline within the week having been 15 points, today's quotations being 2.60c. per lb., East St. Louis, and 2.97c., New York, the lowest in the history of the industry. Premiums are being asked for May and June delivery. Contrasted with the weakness in zinc prices is a firm ore market at Joplin, prices for ore remaining at \$16 to \$17 a ton. Production of ore continued last week at an unchanged rate, but shipments were heavier, amounting to 3574 tons, a gain of 769 tons over those of the preceding week.

Shipments of Brass Ingots

CHICAGO, April 25.—The combined deliveries of brass and bronze ingots and billets by the members of the Non-Ferrous Ingot Metal Institute for the month of March amounted to a total of 2014 tons.

Westinghouse Companies Merge Management

Consolidation of the managerial personnel of the Westinghouse Air Brake Co., Wilmerding, Pa., and the Union Switch & Signal Co., Swissvale, Pa., was announced at the annual meetings of the two companies. A. L. Humphrey, president of the Air Brake company and chairman of the board of the Switch & Signal company, will serve as executive director of the consolidated organization. Charles A. Rowan, executive vice-president and member of the board of directors of the Air Brake company, was elected president of that company and vice-chairman of the board of the Switch & Signal group. G. A. Blackmore, president and general manager of the latter company, was made a director and vice-president and general manager of the Air Brake company. S. G. Down, vice-president of the Air Brake company, was made a director of the Switch & Signal company.

Both of these companies are the oldest in their respective fields, and their management has been closely identified since 1917, when control of the Union Switch & Signal Co. was obtained by the Air Brake organization.

The Week's Prices. Cents Per Pound for Early Delivery

	Apr. 20	Apr. 21	Apr. 22	Apr. 23	Apr. 25	Apr. 26
Lake copper, New York.....	6.00	6.00	6.00	6.00	6.00	6.00
Electrolytic copper, N. Y.....	5.50	5.50	5.50	5.50	5.50	6.00
Straits tin, spot, N. Y.....	19.35	20.12 1/2	19.65	...	20.00	19.65
Zinc, East St. Louis.....	2.75	2.75	2.65	2.62 1/2	2.62 1/2	2.60
Zinc, New York.....	3.12	3.12	3.02	2.99 1/2	2.99 1/2	2.97
Lead, St. Louis.....	2.90	2.90	2.90	2.90	2.90	2.90
Lead, New York.....	3.00	3.00	3.00	3.00	3.00	3.00

*Refinery quotation; price 1/4c. higher delivered in the Connecticut Valley.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 5.35c. a lb., New York.
Brass ingots, 85-5-5-5, 6.12 1/2c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig.....	21.50c. to 22.50c.
Tin, bar.....	22.50c. to 25.50c.
Copper, Lake.....	8.00c. to 9.00c.
Copper, electrolytic.....	7.75c. to 8.75c.
Copper, casting.....	7.50c. to 8.50c.
*Copper sheets, hot-rolled.....	15.37 1/2c.
*High brass sheets.....	12.50c.
*Seamless brass tubes.....	15.75c.
*Seamless copper tubes.....	14.87 1/2c.
*Brass rods.....	10.25c.
*Braided brass tubes.....	21.62 1/2c.
Zinc, slab.....	4.00c. to 4.50c.
Zinc sheets (No. 9), casks.....	9.25c. to 9.50c.
Lead, American pig.....	4.00c. to 4.50c.
Lead, bar.....	5.75c. to 6.75c.
Lead sheets.....	7.50c.
Antimony, Asiatic.....	9.00c. to 10.00c.
Alum., virgin, 99 per cent plus.....	23.30c.
Alum. No. 1 for remelt-ing, 98 to 99 per cent.....	17.00c. to 18.00c.
Solder, 1/2 and 1/2.....	14.75c. to 15.75c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	24.00c.
Tin, bar.....	26.00c.

Copper, Lake.....	7.00c.
Copper, electrolytic.....	7.00c.
Copper, casting.....	6.75c.
Zinc, slab.....	4.25c. to 4.50c.
Lead, American pig.....	3.75c. to 4.00c.
Lead, bar.....	7.25c.
Antimony, Asiatic.....	10.00c.
Babbitt metal, medium grade.....	14.50c.
Babbitt metal, high grade.....	28.00c.
Solder, 1/2 and 1/2.....	16.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	4.25c.	5.00c.
Copper, hvy. and wire	4.00c.	4.75c.
Copper, light and bot-toms.....	3.25c.	4.00c.
Brass, heavy.....	2.25c.	2.75c.
Brass, light.....	1.75c.	2.50c.
Hvy. machine com-position.....	3.25c.	3.75c.
No. 1 vel. brass turnings.....	2.25c.	2.75c.
No. 1 red brass or compos. turnings.....	2.75c.	3.25c.
Lead, heavy.....	2.00c.	2.50c.
Zinc.....	1.00c.	1.625c.
Cast aluminum.....	3.50c.	4.75c.
Sheet aluminum.....	8.50c.	10.00c.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars	
Soft Steel	
Base per Lb.	
Pittsburgh mill	1.60c.
Chicago	1.70c.
Philadelphia	1.91c.
New York	1.95c.
Detroit	1.80c.
Cleveland	1.65c.
Lackawanna	1.70c.
Birmingham	1.75c.
Pacific ports	2.00c.

Billet Steel Reinforcing	
Pittsburgh mills, 40, 50, 60-ft.	1.50c. to 1.60c.
Birmingham, mill lengths	1.75c.
Cleveland	1.50c.

Rail Steel	
Pittsburgh mills, east of Chicago dist.	1.30c. to 1.35c.
Chicago Heights mills	1.50c. to 1.60c.
Philadelphia	1.49c. to 1.59c.

Iron	
Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.11c.
Common iron, del'd New York	2.15c.

Tank Plates	
Base per Lb.	
Pittsburgh mill	1.60c.
Chicago	1.70c.
Birmingham	1.75c.
Cleveland	1.8035c.
Philadelphia	1.7935c.
Coatesville	1.70c.
Sparrows Point	1.70c.
Lackawanna	1.70c.
New York	1.898c.
Pacific ports	1.85c.

Structural Shapes	
Base per Lb.	
Pittsburgh mill	1.60c.
Birmingham	1.75c.
Lackawanna	1.70c.
Bethlehem	1.70c.
Cleveland	1.8035c.
Philadelphia	1.6495c.
New York	1.86775c.
Pacific ports (standard)	2.00c.
Pacific ports (wide flange)	2.10c.

Steel Sheet Piling	
Base per Lb.	
Pittsburgh	1.90c.
Chicago mill	2.05c.
Buffalo	2.00c.

Alloy Steel Bars	
(F.o.b. maker's mill)	
Alloy Quantity Bar Base, 2.65c. per Lb.	
S.A.E.	Alloy Differential per 100 Lb.
2000 (1/2% Nickel)	\$0.25
2100 (1 1/2% Nickel)	0.55
2300 (3/4% Nickel)	1.50
2500 (1% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3400 Nickel Chromium	3.30
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
4100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flat)	0.25
Round and squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is 3/4c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Cold-Finished Bars	
Base per Lb.	
Pittsburgh mill	2.00c.
Chicago	2.00c.
Cleveland	1.90c. to 2.00c.
Buffalo	2.00c.
Shafing, ground, f.o.b. mill	2.35c. to 3.30c.

*According to size.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets	
Hot-rolled	
Base per Lb.	
No. 10, f.o.b. Pittsburgh	1.55c.
No. 10, f.o.b. Chicago mill	1.65c.
No. 10, del'd Philadelphia	1.80c.
No. 10, f.o.b. Birmingham	1.70c.
No. 10, c.l.f. Pacific Coast ports	2.30c.

Hot-Rolled and Annealed	
No. 10, Pittsburgh	1.70c.
No. 10, Chicago mills	1.80c.
No. 10, Birmingham	1.85c.

Hot-Rolled Annealed	
No. 24, f.o.b. Pittsburgh	2.20c.
No. 24, f.o.b. Chicago mills	2.30c.
No. 24, del'd Philadelphia	2.46c. to 2.51c.
No. 24, f.o.b. Birmingham	2.35c. to 2.50c.
No. 24, c.l.f. Pacific Coast ports	2.85c.

Heavy Cold-Rolled	
No. 10 gage, f.o.b. Pittsburgh	2.25c.
No. 10 gage, f.o.b. Chicago mills	2.35c.
No. 10 gage, del'd Philadelphia	2.46c.

Light Cold-Rolled	
No. 20 gage, f.o.b. Pittsburgh	2.75c.
No. 20 gage, f.o.b. Chicago mills	2.85c.
No. 20 gage, del'd Philadelphia	3.00c.

Automobile Body Sheets	
No. 20, f.o.b. Pittsburgh	2.90c.

Steel Furniture Sheets	
No. 10, f.o.b. Pittsburgh	2.65c.
No. 20, f.o.b. Pittsburgh	3.15c.

(Prices on furniture stock include stretcher leveling but not resquaring.)

Galvanized Sheets	
No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.10c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, c.l.f. Pacific Coast ports	3.50c.

Long Ternes	
No. 24, unassorted, 8-lb. coating, f.o.b. P'gh	2.90c. to 3.00c.

Vitrous Enameling Stock	
No. 10 f.o.b. Pittsburgh	2.60c.
No. 20, f.o.b. Pittsburgh	3.10c.

Tin Mill Black Plate	
No. 28, f.o.b. Pittsburgh	2.40c. to 2.50c.
No. 28, Chicago mill	2.50c. to 2.60c.

Tin Plate	
Base per Box	
Standard cokes, f.o.b. P'gh district mills	\$1.75
Standard cokes, f.o.b. Gary	4.85

Terne Plate	
(F.o.b. Morgantown or Pittsburgh)	
(Per Package, 20 x 28 in.)	
8-lb. coating I.C.	\$9.50
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.10
30-lb. coating I.C.	14.90
40-lb. coating I.C.	16.70

Hot-Rolled Hoops, Bands and Strips	
Base per Lb.	
6 in. and narrower, Pittsburgh	1.50c. to 1.60c.
Wider than 6 in., P'gh	1.40c. to 1.50c.
6 in. and narrower, Chicago	1.60c. to 1.70c.
Wider than 6 in., Chicago	1.50c. to 1.60c.
Copperage stock, P'gh	1.60c. to 1.70c.
Copperage stock, Chicago	1.70c. to 1.80c.

Cold Rolled Strips	
F.o.b. Pittsburgh	2.00c.
F.o.b. Cleveland	2.00c.
Del'd Chicago	2.20c.
F.o.b. Worcester	2.20c.
Fender stock No. 29 gage, Pittsburgh or Cleveland	3.00c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)
(After Dec. 31, extras of 10c. a 100 lb. on mixed and joint carloads, 25c. on pool carloads and 40c. on less than carload will be applied on all merchant wire products.)

To Manufacturing Trade	
Bright wire	2.20c.
Spring wire	3.20c.

To Jobbing Trade	
Base per 100	
Standard wire nails	\$1.95
Smooth coated nails	1.95
Galvanized nails	3.95

Base per Lb.	
Smooth annealed wire	2.35c.
Smooth galvanized wire	2.80c.
Polished staples	2.50c.
Galvanized staples	2.75c.

Barbed wire, galvanized.....2.60c.
Woven wire fence, No. 9 gage, per net 100.....\$35.00
Woven wire fence, No. 12 1/2 gage and lighter, per net 100.....60.00
Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

STEEL PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld	
Steel	Iron
Inches Black Galv.	Inches Black Galv.
1/4 to 3/8	1/4 to 3/8
3/8 to 1/2	3/8 to 1/2
1/2 to 3/4	1/2 to 3/4
3/4 to 1	3/4 to 1
1 to 1 1/2	1 to 1 1/2
1 1/2 to 2	1 1/2 to 2
2 to 3	2 to 3

Lap Weld	
2 to 6	45 1/2
6 to 10	49 1/2
10 to 12	51 1/2

Butt Weld, extra strong, plain ends	
1/4 to 3/8	26 1/2
3/8 to 1/2	32 1/2
1/2 to 3/4	34 1/2
3/4 to 1	36 1/2
1 to 1 1/2	38 1/2
1 1/2 to 2	40 1/2
2 to 3	42 1/2

Lap Weld, extra strong, plain ends	
2 to 6	45 1/2
6 to 10	49 1/2
10 to 12	51 1/2

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discounts of 5 and 2 1/2%, and on galvanized by 1 1/2 points with supplementary discounts of 5 and 2 1/2%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2 1/2%. No Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh	
Steel	Charcoal Iron
2 in. and 2 1/2	1 1/2 in. 1
2 1/2 in. 34	1 3/4 in. 8
2 3/4 in.—2 1/2 in. 46	2 in. to 2 1/2 in. 13
2 1/2 in. 52	2 1/4 in.—2 1/2 in. 16
2 3/4 in.—3 1/2 in. 54	2 1/2 in. 17
3 in. 57	3 1/4 in. to 3 1/2
3 1/2 in. to 3 1/2	3 1/2 in. 18
3 1/2 in. to 4 in. 46	3 3/4 in. 21
	4 in. 24
	4 1/4 in. 29

Skelp	
(F.o.b. Pittsburgh or Youngstown)	
	Per Lb.
Grooved	1.50c. to 1.60c.
Universal	1.50c. to 1.60c.
Sheared	1.50c. to 1.60c.

Wire Rods	
(Common soft, base)	
	Per Gross Ton
Pittsburgh	\$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Coke	
	Per Net Ton
Furnace, f.o.b. Connellsville	\$2.25
Foundry, f.o.b. Connellsville	\$3.25 to 4.50
Foundry, by-product, Chicago	7.50
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.35 to 8.75
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	8.27
Foundry, Birmingham	5.00
Foundry, by-products, St. Louis, f.o.b., ovens	8.00
Foundry, by-products, del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.40 to \$1.50
Mine run coking coal, f.o.b. W. Pa.	1.50 to 1.60
Gas coal, 4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	0.75 to 0.80
Gas slack, f.o.b. W. Pa. mines	0.75 to 0.80

Fuel Oil	
Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	1.00c.
No. 4 industrial	1.50c.
Per Gal. f.o.b. Baltimore	
No. 3 distillate	1.00c.
No. 4 industrial	1.50c.
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	2.75c.
No. 5 industrial fuel oil	2.60c.
Per Gal. f.o.b. Cleveland	
No. 3 industrial fuel oil	1.00c.
No. 4 distillate	1.50c.

REFRACTORIES

Fire Clay Brick	
Per 1000 f.o.b. Works	
High-heat	Intermediate
Duty Brick	Duty Brick
Penn.	\$28.00 to \$30.00
Maryland	28.00 to 30.00
New Jer.	\$24.00 to \$26.00
Ohio	28.00 to 30.00
Kentucky	28.00 to 30.00
Missouri	28.00 to 30.00
Illinois	28.00 to 30.00
Ground fire clay, per ton	8.50

Chrome Brick	
Per Net Ton	
Standard size	\$42.50

Silica Brick	
Per 1000 f.o.b. Works	
Pennsylvania	\$38.00
Chicago	47.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick	
Per Net Ton	
Standard size, f.o.b. Baltimore and Chester, Pa.	\$61.50
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	38.50
Domestic, f.o.b. Chevelah, Wash.	20.90

CAST IRON PIPE

Per Net Ton	
6-in. and larger, del'd	\$36.40 to \$38.40
4-in., del'd Chicago	39.40 to 41.40
6-in. and larger, del'd New York	\$28.20
4-in., del'd New York	31.20
6-in. and larger, Birm'ham	\$32.00 to 33.00
4-in., Birmingham	35.00 to 36.00
Class "A" and gas pipe, \$3 extra.	

Pig Iron, Ores, Ferroalloys

VALLEY	
Per gross ton, f.o.b. Valley furnace:	
Basic	\$14.50
Bessemer	15.50
Gray forge	15.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.50
Low phos., copper free	25.00

Freight rate to Pittsburgh or Cleveland district, \$1.89.

PITTSBURGH	
Per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$15.00
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.00
Bessemer	16.00

Freight rates to points in Pittsburgh district range from 69c. to \$1.20.

CHICAGO	
Per gross ton at Chicago furnace:	
N'th'n No. 2 fdy.	\$16.00
N'th'n No. 1 fdy.	16.50
Malleable, not over 2.25 sil.	16.00
High phosphorus	16.00
Lake Super. charcoal	23.17
S'th'n No. 2 fdy.	16.14
Low phos., sil. 1 to 2	22.50 to 22.60
Silvery, sil. 8 per cent	23.67
Bess. ferro-silicon, 15 per cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS	
Per gross ton at St. Louis:	
No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
Northern No. 2 fdy., del'd	\$18.30 to 18.80
St. Louis No. 2 fdy., del'd	14.50
Northern malleable, del'd	18.30 to 18.80
Northern basic, del'd	18.30 to 18.80

Freight rates \$3c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$1.50 from Birmingham.

NEW YORK	
Per gross ton, delivered New York district:	
*Buffalo, No. 2, del'd	\$17.91 to \$18.41
East, Pa. No. 2 fdy.	16.52 to 17.02
East, Pa. No. 2X fdy.	17.02 to 17.52

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.

BUFFALO	
Per gross ton, f.o.b. furnace:	
No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. 2.25 to 2.75	16.50
Basic	15.50
Lake Superior charcoal, del'd	23.41

Per gross ton delivered to most New England points:

*Buffalo, sil.	1.75 to 2.25, \$19.54 to \$20.04
*Buffalo, sil.	2.25 to 2.75, \$19.54 to \$20.04
*Ala., sil.	1.75 to 2.25, 19.74
*Ala., sil.	2.25 to 2.75, 20.24
*Ala., sil.	1.75 to 2.25, 15.88
*Ala., sil.	2.25 to 2.75, 16.28

Freight rates: \$5.01 all rail from Buffalo; \$9.75 all rail from Alabama and \$5.88 rail and water from Alabama to New England seaboard.

CINCINNATI	
Per gross ton, delivered Cincinnati:	
Ala. fdy., sil. 1.75 to 2.25	\$13.82
Ala. fdy., sil. 2.25 to 2.75	14.32
Tenn. fdy., sil. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	\$17.01 to 17.50
S'th'n Ohio silvery, 8%	21.02

Freight rates, \$2.02 from Ironton and Jackson, Ohio; \$3.82 from Birmingham.

PHILADELPHIA	
Per gross ton at Philadelphia:	
East, Pa. No. 2	\$15.53 to \$16.03
East, Pa. No. 2X	16.03 to 16.53
East, Pa. No. 1X	16.53 to 17.03
Basic (del'd east, Pa.)	16.00
Malleable	18.00 to 18.50
Stand. low phos. (f.o.b. east, Pa. furnace)	22.00 to 23.00
Con. b't'g low phos. (f.o.b. furnace)	22.00 to 22.50

Va. No. 2 plain	22.01
Va. No. 2X	22.54

Prices, except as specified otherwise, are del'd'd Philadelphia. Freight rates: 84c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

CLEVELAND	
Per gross ton at Cleveland furnace:	
N'th'n No. 2 fdy. (local delivery)	\$15.50
S'th'n fdy., sil. 1.75 to 2.25	16.14
Malleable (local delivery)	15.50
Ohio silvery, 8 per cent	21.87
Stand. low phos., Valley	27.00

Prices are f.o.b. furnaces except on Southern foundry and silvery iron. Freight rates: 55c. average local switching charge; \$3.12 from Jackson, Ohio; \$6.14 from Birmingham.

BIRMINGHAM	
Per gross ton, f.o.b. Birmingham dist. furnaces:	
No. 2 fdy., 1.75 to 2.25 sil.	\$11.00
No. 2 soft, 2.25 to 2.75 sil.	11.50
Basic	11.00

CANADA	
Per gross ton:	
Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.60
No. 2 fdy., sil. 1.75 to 2.25	22.10
Basic	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

Per Gross Ton Domestic, 80%, seaboard *\$72.00 to \$75.00 Foreign, 80%, Atlantic or Gulf port, duty paid *\$72.00 to 75.00

*Minimum price quoted for lots of 2000 tons or more.

Spiegelisen	
Per Gross Ton Furnace	
Domestic, 10 to 21%	\$26.00 to \$27.00

Electric Ferrosilicon	
Per Gross Ton Delivered	
50% (carloads)	\$77.50
50% (less carloads)	85.00
75% (carloads)	126.00
75% (less carloads)	136.00
14% to 16% (f.o.b. Welland Ont., in carloads)	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferrosilicon	
F.o.b. Jackson County, Ohio, Furnace	
10% Per Gross Ton	\$20.50
11% Per Gross Ton	21.00
12% Per Gross Ton	21.50
13% Per Gross Ton	22.50
14% Per Gross Ton	23.50

Silvery Iron	
F.o.b. Jackson County, Ohio, Furnace	
6% Per Gross Ton	\$18.00
7% Per Gross Ton	18.50
8% Per Gross Ton	18.75
9% Per Gross Ton	19.00
10% Per Gross Ton	19.50
11% Per Gross Ton	20.00

Other Ferroalloys
Ferrotungsten, per lb. wa. del., carloads \$1.08

Ferrotungsten, less carloads \$1.15 to 1.18	
Ferrocromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	10.00c.
Ferrocromium, 2% carbon	17.00c. to 17.50c.
Ferrocromium, 1% carbon	19.00c. to 20.00c.
Ferrocromium, 0.10% carbon	23.50c. to 25.00c.
Ferrocromium, 0.06% carbon	25.50c. to 27.00c.
Ferrovandium, del., per lb. contained Va.	\$3.05 to \$3.30
Ferrocobalt, 15 to 18%, per net ton, f.o.b. furnace, in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base	35.00
Ferromolybdenum, per lb. Mo. del.	45.00
Calcium molybdate, per lb. Mo. del.	30.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	\$113.00
Silico spiegel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	\$5 a ton high

Ores
Lake Superior Ores, Delivered Lower Lake Ports

Per Gross Ton	
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.80
Mesabi Bessemer, 51.50% iron	4.80
Mesabi non-Bessemer, 51.50% iron	4.80
High phosphorus, 51.50% iron	4.80

Foreign Ore, c.i.f. Philadelphia or Baltimore

Per Ton	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8.50c.
Iron, low phos., Swedish, average 68 1/2% iron	9.00c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic and foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian	24.00c.
Manganese, African, Indian, 50-52%	23c. to 24c.
Manganese, Brazilian, 46 to 48%	21c. to 22c.

Per Gross Ton	
Tungsten, Chinese wolframite	\$10.75 to \$11.00
Tungsten, domestic scheelite	10.00 to 10.50
Chrome, 45% Cr2O3 crude, c.i.f. Atlantic seaboard	18.00
Chrome, 48%, Cr2O3, c.i.f. Atlantic seaboard	20.00

Fluorspar	
Per Net Ton	
Domestic, washed gravel, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	\$28.10
No. 2 lump, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	22.50
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid, \$17.00 to 17.40	
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	32.00

Old Material

PITTSBURGH	
Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.75 to \$10.25
No. 2 heavy melting steel	8.50 to 8.75
No. 2 railroad wrought	9.75 to 10.25
Scrap rails	8.50 to 8.75
Rails 3 ft. and under	11.50 to 12.00
Sheet bar crops, ordinary	10.00 to 10.50
Compressed sheet steel	9.25 to 9.75
Hand bundled sheet steel	8.00 to 8.50
Hot steel axle turnings	8.25 to 8.75
Machine shop turnings	6.50 to 7.00
Short shop steel turnings	6.50 to 7.00
Short mixed borings and turnings	6.50 to 7.00
Cast iron borings	6.50 to 7.00
Cast iron carwheels	9.75 to 10.25
Heavy breakable cast	8.00 to 8.50
No. 1 cast	9.00 to 10.00
Rail knuckles and couplers	10.50 to 11.00
Rail, coil and leaf springs	10.50 to 11.00
Rolled steel wheels	10.50 to 11.00
Low phos. billet crops	12.50 to 13.00
Low phos. sheet bar crops	12.50 to 13.00
Low phos. plate scrap	11.00 to 11.50
Low phos. punchings	11.00 to 11.50
Steel car axles	15.00 to 15.50

CHICAGO	
Delivered Chicago district consumers:	
Heavy melting steel	\$6.75 to \$7.00
Shoveling steel	6.75 to 7.00

Frog, switches and guards	6.75 to 7.00
Hydraulic comp. sheets	5.50 to 6.00
Drop forge flashings	5.00 to 5.50
No. 1 busheling	4.75 to 5.25
Rolled carwheels	7.50 to 8.00
Railroad tires	8.75 to 9.25
Railroad leaf springs	8.25 to 8.75
Steel couplers and knuckles	5.25 to 5.75
Coil springs	7.25 to 7.75
Coil turnings (elec. fur.)	9.00 to 9.50
Low phos. punchings	9.00 to 9.50
Low phos. plates, 12 in. and under	8.50 to 9.00
Cast iron borings	3.25 to 3.75
Short shoveling turnings	3.50 to 4.00
Machine shop turnings	3.00 to 3.50
Rerolling rails	9.00 to 9.50
Steel rails, less than 3 ft.	8.75 to 9.25
Steel rails, less than 2 ft.	9.00 to 9.50
Angle bars, steel	8.25 to 8.75
Cast iron carwheels	7.00 to 7.50
Railroad malleable	6.25 to 6.75
Agricultural malleable	5.75 to 6.25
*Relaying rails, 56 to 60 lb.	15.00 to 17.00
*Relay rails, 65 lb. and up	18.00 to 20.00
Iron angle and splice bars	\$6.00 to \$6.50
Iron arch bars, transoms	6.00 to 6.50
Iron car axles	12.00 to 13.00
Steel car axles	8.75 to 9.25
No. 1 railroad wrought	5.25 to 5.75
No. 2 railroad wrought	6.00 to 6.50
No. 1 busheling	4.50 to 5.00

No. 2 busheling	2.50 to 3.00
Locomotive tires, smooth	8.00 to 9.00
Pipes and flues	3.25 to 3.75
No. 1 machinery cast	7.00 to 7.50
Tram automobile cast	6.75 to 7.25
No. 1 railroad cast	6.50 to 7.00
No. 1 agricultural cast	5.75 to 6.25
Stove plate	5.25 to 5.75
Grate bars	5.25 to 5.75
Brake shoes	6.00 to 6.50

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$7.00 to \$7.50
No. 2 heavy melting steel	5.00 to 5.50
No. 1 railroad wrought	8.50 to 9.00
Bundled sheets	5.00 to 5.50
Hydraulic compressed, new	5.00 to 5.50
Hydraulic compressed, old	5.00 to 5.50
Machine shop turnings	3.50 to 4.00
Heavy axle turnings	6.00 to 6.50
Cast borings (nom.)	3.50 to 4.00
Heavy breakable cast	8.50 to 9.00
Stove plate (steel works)	9.00 to 10.00
No. 1 low phos. hvy	8.00 to 8.50
Couplers and knuckles	8.00 to 8.50
Roller steel wheels	8.00 to 8.50
No. 1 blast furnace (nom.)	3.50 to 4.00
Spec. iron and steel pipe	7.50 to 8.00
Shafting	12.50 to 13.50
Steel axles	14.00 to 14.50
No. 1 forge fire	9.00 to 9.50
Cast iron carwheels	9.50 to 10.00
No. 1 cast	9.00 to 9.50
Cast borings (chem.)	10.00 to 11.00
Steel rails for rolling	9.00 to 9.50

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$7.00 to \$7.50
No. 2 heavy melting steel	6.50 to 7.00
Compressed sheet steel	7.00
Light bundled sheet stampings	6.00 to 6.50
Drop forge flashings	6.00 to 6.25
Machine shop turnings	3.75 to 4.00
Short shoveling turnings	5.75 to 6.25
No. 1 busheling	6.50 to 6.75
Steel axle turnings	7.50 to 8.00
Low phos. billet crops	14.00 to 14.50
Cast iron borings	5.75 to 6.00
Mixed borings and short turnings	5.75 to 6.00
No. 2 busheling	5.75 to 6.00
No. 1 cast	8.00 to 8.50
Railroad grate bars	6.00 to 6.50
Stove plate	6.00 to 6.50
Rails under 3 ft.	12.00 to 12.50
Rails for rolling	11.00 to 11.50
Railroad malleable	9.50 to 10.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	\$7.00
No. 2 heavy melting steel	5.00
Scrap rails	\$7.50 to 8.00
New hydrant. comp. sheets	5.00
Old hydrant. comp. sheets	4.00 to 4.50
Drop forge flashings	5.00
No. 1 busheling	7.00
HP steel axle turnings	5.00
Machine shop turnings	10.00
Knuckles and couplers	10.00
Oil and leaf springs	10.00
Roller steel wheels	10.50 to 11.00
Low phos. billet crops	10.50 to 11.00
Steel short steel turnings	6.50 to 7.00
Short mixed borings and turnings	6.00 to 6.50
Cast iron borings	6.00 to 6.50
No. 2 busheling	3.50 to 4.00
Steel car axles	10.00 to 11.00
Drop axles	9.00 to 9.50
No. 1 machinery cast	9.25 to 9.75
No. 1 cupola cast	8.75 to 9.00
Stove plate	8.25 to 8.75
Steel rails, 3 ft. and under	10.50 to 11.00
Cast iron carwheels	8.00 to 9.00
Industrial malleable	8.00 to 9.00
Railroad malleable	8.00 to 9.00
Chemical borings	8.00 to 8.50

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$7.50 to \$8.00
Scrap steel rails	7.50 to 8.00
Short shoveling turnings	3.50 to 4.00
Stove plate	6.00 to 6.50
Steel axles	12.00 to 12.50
Iron axles	12.00 to 12.50
No. 1 railroad wrought	6.00 to 6.50
Rails for rolling	9.00 to 9.50
No. 1 cast	8.50 to 9.00
Tramway wheels	8.50 to 9.00
Cast iron borings, chem.	8.50 to 9.00

ST. LOUIS

Dealers' buying prices per gross ton:	
Selected heavy steel	\$6.75 to \$7.25
No. 1 heavy melting	6.25 to 6.75
No. 2 heavy melting	5.50 to 6.00
No. 1 locomotive tires	6.00 to 6.50
Misc. stand-sec. rails	6.50 to 7.00
Railroad springs	7.50 to 8.00
Bundled sheets	4.25 to 4.75
No. 2 railroad wrought	6.25 to 6.75
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	4.75 to 5.25
Iron rails	7.00 to 7.50
Rails for rolling	8.00 to 8.50
Heavy shop turnings	3.00 to 3.50
Heavy turnings	5.00 to 5.50
Short car axles	10.00 to 10.50
Iron car axles	12.50 to 13.00
Wrought iron bars and trans.	5.00 to 5.50
No. 1 railroad wrought	4.75 to 5.25
Steel rails, less than 3 ft.	8.50 to 9.00
Steel angle bars	6.50 to 7.00

Cast iron carwheels	5.50 to 6.00
No. 1 machinery cast	7.50 to 8.00
Railroad malleable	5.00 to 5.50
No. 1 railroad cast	5.75 to 6.25
Stove plate	6.00 to 6.50
Relay, rails, 60 lb. and under	16.00 to 16.50
Relay, rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable	5.00 to 5.50

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$4.25 to \$5.50
No. 2 heavy melting steel	4.00 to 4.50
Heavy melting steel (yard)	3.75 to 4.00
No. 1 hvy. breakable cast	4.75 to 5.00
Stove plate (steel works)	2.75 to 3.00
Machine shop turnings	1.00 to 1.50
Short shoveling turnings	1.00 to 1.50
Cast borings	1.00 to 1.50
No. 1 blast furnace	1.00 to 1.50
Steel car axles	10.00 to 10.50
Iron car axles (nom.)	14.00 to 14.50
Spec. iron and steel pipe	2.75 to 3.00
Forge fire	2.25 to 2.50
No. 1 railroad wrought	4.75 to 5.00
No. 1 yard wrought, long	3.75 to 4.00
Rails for rolling	6.00 to 6.25
No. 1 cast	5.50 to 5.75
No. 2 cast	4.50 to 5.00
Stove plate (foundry)	4.50 to 5.00
Malleable cast (railroad)	5.50 to 6.00
Cast borings (chemical)	6.00 to 6.50

Per gross ton, delivered local foundries:	
No. 1 machinery cast	\$3.50
No. 1 hvy. cast (cupola size)	7.50
No. 2 cast	6.50

PITTSBURGH

Base per lb.	
Plates	2.85c
Structural shapes	2.85c
Soft steel bars and small shapes	2.60c
Reinforcing steel bars	2.60c
Cold-finished and screw stock	2.60c
Rounds and hexagons	3.10c
Squares and flats	3.10c
Band	3.60c
Hoops	2.95c
Hot-rolled annealed sheets (No. 24)	3.50c
25 or more bundles	3.15c
Galv. sheets (No. 24), 25 or more bundles	3.65c
Hot-rolled sheets (No. 10)	3.10c
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	\$1.74
Spikes, large	2.50c
Small	2.75c to 2.90c
Heat	3.00c
Track bolts, all sizes, per 100 count	70 and 10 per cent off list
Machine bolts, 100 count	70 and 10 per cent off list
Carriage bolts, 100 count	70 and 10 per cent off list
Nuts, all styles, 100 count	70 and 10 per cent off list
Large rivets, base per 100 lb.	\$3.90
Wire, black, soft ann'd, base per 100 lb.	2.75
Wire, galv. soft, base per 100 lb.	3.20
Common wire nails, per keg	2.35
Cement coated nails, per keg	2.35

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

Base per lb.	
Plates and structural shapes	3.00c
Soft steel bars	2.75c
Reinforcing bars, billet steel	1.75c
Rail steel reinforcement	1.55c to 1.65c
Cold-fn. steel bars and shafting—	
Rounds and hexagons	3.10c
Plats and squares	3.60c
Bands, 1/2 in. (in Nos. 10 and 12 gages)	2.95c
Hoops (No. 14 gage and lighter)	3.50c
Hot-rolled annealed sheets (No. 22)	3.55c
Galv. sheets (No. 24)	4.10c
Hot-rolled sheets (No. 10)	3.20c
Spikes 1/2 in. and lighter	4.20c
Track bolts	3.75c
Rivets, structural	3.75c
Rivets, boiler	3.75c
Per Cent Off List	
Machine bolts	73
Carriage bolts	73
Coupler and lag screws	73
Hot-pressed nuts, sq. tap, or blank	73
Hot-pressed nuts, hex. tap, or blank	73
No. 8 black ann'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg	2.30
Cement c'd-nails, base per keg	2.30

NEW YORK

Base per lb.	
Plates and struc. shapes	2.70c to 3.10c
Soft steel bars, small shapes	2.70c to 3.10c
Iron bars, Swed. charcoal	6.00c to 6.50c
Cold-fn. shafting and screw stock	3.40c
Rounds and hexagons	3.40c
Plats and squares	3.90c
Cold-roll. strip, soft and quarter hard	4.95c
Hoops	3.75c
Hot-rolled reinforcement	3.40c
Hot-rolled sheets (No. 10)	3.00c to 3.25c
Hot-rolled ann'd sheets (No. 24)	3.60c
Galvanized sheets (No. 24)	4.00c
Long term sheets (No. 24)	5.00c
Standard tool steel	12.00c
Wire, black annealed (No. 10)	3.60c
Wire, galv. annealed (No. 10)	4.05c
Tire steel, 1/2 x 1/2 in. and larger	3.40c
Smooth finish, 1 to 2 1/2 x 1/4 in. and larger	3.75c
Open-hearth spring steel, bases	4.50c to 7.00c
Common wire nails, base, per keg	\$2.60

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$4.00 to \$4.25
Scrap T rails	3.80 to 4.00
Machine shop turnings	.80 to 1.00
Cast iron borings	1.05 to 1.25
Bundled skeleton, long	2.00 to 2.50
Forge flashings	3.00 to 3.50
Blast furnace scrap	0.90 to 1.00
Forge scrap	3.00 to 3.25
Shafting	9.50 to 10.00
Steel car axles	9.00 to 9.50
Wrought pipe	4.00 to 4.25
Rails for rolling	6.00 to 6.50
Cast iron borings, chemical	7.00 to 7.25

Per gross ton delivered consumers' yards:	
Textile cast	\$7.00 to \$7.50
No. 1 machinery cast	7.50 to 8.00
Stove plate	5.00 to 5.25
Railroad malleable	10.50 to 11.00

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$6.00 to \$7.00
Scrap rails for melting	8.00 to 8.50
Loose sheet clippings	1.50 to 2.00
Bundled sheets	4.75 to 5.25
Cast iron borings	2.75 to 3.25
Machine shop turnings	3.25 to 3.75
No. 1 busheling	4.25 to 4.75
No. 2 busheling	2.50 to 3.00
Rails for rolling	9.00 to 9.50
No. 1 locomotive tires	8.50 to 9.00
Short rails	12.75 to 13.25
Cast iron carwheels	8.25 to 8.75
No. 1 machinery cast	10.00 to 10.50
No. 1 railroad cast	8.75 to 9.25

Burnt cast	4.25 to 4.75
Stove plate	4.25 to 4.75
Agricultural malleable	8.00 to 8.50
Railroad malleable	9.00 to 9.50

DETROIT

Dealers' buying prices per gross per ton:	
Hvy. melting	\$5.25 to \$5.75
Borings and short turnings	3.75 to 4.25
Long turnings	2.75 to 3.25
No. 1 machinery cast	8.00 to 8.50
Automotive cast	10.25 to 10.75
Hydraul. comp. sheets	5.25 to 5.75
Stove plate	4.25 to 4.75
New No. 1 busheling	4.25 to 4.75
Old No. 2 busheling	2.75 to 3.25
Sheet clippings	2.75 to 3.25
Flashings	4.50 to 5.00

CANADA

Dealers' buying prices per gross ton:	
Heavy melting steel	Toronto \$7.00 Montreal \$4.00
Rails, scrap	7.00
No. 1 wrought	6.00
Machine shop turnings	2.00
Boiler plate	5.00
Heavy axle turnings	2.50
Cast borings	2.00
Steel borings	2.00
Wrought pipe	2.00
Steel axles	7.00
Axles, wrought iron	7.00
No. 1 machinery cast	12.50
Stove plate	10.00
Standard carwheels	11.00
Malleable	10.00

Warehouse Prices for Steel Products

Machine bolts, cut thread:	
1/2 x 6 in. and smaller	Off List
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
1/2 x 6 in. and smaller	65 to 65 and 10
1/2 x 20 in. and smaller	65 to 65 and 10
Boiler Tubes:	
Lap welded, 2-in.	\$19.00
Seamless welded, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per lb.	
Plates and struc. shapes	3.25c
Bars, soft steel or iron	3.00c
Cold-fn. rounds, shafting, screw stock	3.35c
Hot-rolled annealed sheets (No. 24)	3.50c
Galv. sheets (No. 24)	4.35c
Hot-rolled sheets (No. 10)	2.45c
Black corrug. sheets (No. 24)	3.85c
Galv. corrug. sheets	4.40c
Structural rivets	4.00c
Boiler rivets	1.60c
Per Cent Off List	
Tank rivets, 1/2-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	73
Carriage bolts	73
Lag screws	73
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more	73
Hot-pressed nuts, hex. blank or tapped, 200 lb. or more	73
Less than 200 lb.	63

PHILADELPHIA

Base per lb.	
Plates, 1/2-in. and heavier	2.45c
Structural shapes	2.45c
Soft steel bars, small shapes, iron bars (except bands)	2.45c
Reinforce. steel bars, sq. twisted and deformed	2.30c
Cold-fn. steel, rounds and hex.	3.30c
Cold-fn. steel, sq. and flats	3.30c
Steel hoops	3.00c
Steel bands, No. 12 to 3/16-in. incl.	2.75c
Spring steel	5.00c
Hot-rolled annealed sheets (No. 24)	3.55c
Galvanized sheets (No. 24)	3.75c
Hot-rolled and annealed sheets (No. 10)	3.05c
Diam. pat. floor plates, 1/2 in.	5.00c
Swedish iron bars	6.80c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

CLEVELAND

Base per lb.	
Plates and struc. shapes	2.95c
Soft steel bars	2.75c
Reinforce. steel bars	1.75c to 1.95c
Cold-fn. rounds and hex.	3.10c
Cold-fn. flats and sq.	3.60c
Hoops and bands, No. 12 to 3/16 in.	2.75c
Hoops and bands, No. 13 and lighter	3.00c
Cold-finished strip	5.55c
Hot-rolled annealed sheets (No. 24)	3.25c
Galvanized sheets (No. 24)	3.75c
Hot-rolled sheets (No. 10)	3.00c
Black ann'd wire, per 100 lb.	\$2.75
No. 9 galv. wire, per 100 lb.	2.20
Com. wire nails, base per keg	2.35

*Net base, including boxing and cutting to length.

CINCINNATI

Base per lb.	
Plates and struc. shapes	3.25c
Bars, soft steel or iron	3.00c
New billet reinforce. bars	3.00c
Rails steel reinforce. bars	3.00c
Hoops	3.00c
Bands	3.20c

PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Business Is Not Gaining

April Orders Probably Will Not Exceed
Those of March and May
Be Smaller

NOTHING has occurred to relieve the extreme dullness of machine tool business. April certainly will be no better than March, and the official report of sales, compiled each month by the National Machine Tool Builders' Association, may disclose a decline from last month, which was the poorest of the depression period.

From Chicago it is reported that transactions are very scarce, but that interest among prospective buyers ap-

pear to be growing. Peoria, Ill., is building a manual training school and is now asking for prices on wood-working tools and will soon issue an inquiry for metal-working tools. The International Harvester Co. will need some tools for production of a large tractor.

At Cleveland dealers are making few sales and have scarcely any inquiries. Some of the tool manufacturers say that inquiries are better, but few of these are resulting in orders.

Manufacturers are possibly lining up the equipment they will need when business comes back.

Cincinnati machine tool builders are hoping that recent developments in the automobile industry will result in a demand for new machine tool equipment.

Throughout the East there is no break in the almost complete stagnation of business. Only scattered orders for single machines are being received.

◀ NORTH ATLANTIC ▶

Sanitary Commission, Department of Sanitation, Municipal Building, New York, plans installation of power and pumping equipment, conveying and other mechanical equipment in proposed sewage disposal plants in Newtown and Coney Island districts. Cost about \$2,100,000 and \$1,000,000, respectively. Leonard C. L. Smith is engineer.

Superintendent of Lighthouses, Staten Island, N. Y., asks bids until May 2 for 20 1000-lb. bell buoys (Schedule 39931); until May 4 for 14 steel bodies for gas buoys, each with skeleton lantern tower and bottom counterweight, from 9 ft. diameter and 32 ft. long to 7 ft. diameter by 18 ft. long.

Gerriets & Blocker, Inc., Bayside, L. I., has been organized by Fred Gerriets, 216-12 Thirty-eighth Avenue, heating and plumbing equipment, and Peter Blocker, 1 Higgins Avenue, to manufacture ornamental iron and metal products.

Titanium Pigment Co., 60 John Street, New York, lead products, has purchased 82 acre tract at South Amboy, N. J., for new plant of several units. Projects will include machine shop, pumping and power station. Cost over \$1,000,000 with equipment. Company is affiliated with National Lead Co., 111 Broadway, New York.

Albany Port Commission, 74 Chapel Street, Albany, N. Y., is arranging for additional port development to cost \$4,266,000. Work will include 400-ft. dock extension, with elevating, conveying, loading and other equipment, completion of grain elevator projects previously authorized, shops and other structures. Arnold G. Chapman is chief engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 3 for 50 automatic air compressors with tank (Schedule 7881) for Brooklyn Navy Yard, and for 400 metal lockers (Schedule 7885).

Standard Oil Co. of New York, 26 Broadway, approved plans for addition to bulk storage and distributing plant, Kingsland Avenue and Norman Street, Brooklyn, including one-story blower building.

Albany Machine & Tool Works, Inc., Albany, N. Y., has been organized by Carl A. Stoughton and Melville P. Stoughton, 114 Lancaster Street, to operate general machine shop and tool manufacturing plant.

Board of Transportation, 250 Hudson Street, New York, asks bids until May 6 for electric heating equipment, station and tunnel lighting equipment, ventilating equipment, etc., for city-owned subway system from 182nd to 205th Street, Bronx.

Jenkins Television Corp., Manhattan Avenue and Factory Street, Passaic, N. J., manu-

facturer of television and radio equipment, through Leslie S. Gordon, president, and associates, has organized Canadian Television, Ltd., Montreal, to manufacture television transmitting and receiving equipment for Canadian market. Company will establish plant and laboratories at Montreal. W. J. Jarrard, chief engineer, Baird Television Corp., 145 West Forty-fifth Street, New York, will be associated with new company.

Hinde & Dauch Paper Co., Decatur Street, Sandusky, Ohio, manufacturer of corrugated fibre containers and boxes, has purchased property at Hoboken, N. J., as site for new Eastern plant. Cost over \$150,000 with machinery.

Control-O-Graph Co., Inc., Clifton, N. J., care of Corbin & Harty, 15 Broadway, Passaic, N. J., has been organized by Charles D. Owen, Clifton, and Thomas W. Thomas, Montclair, N. J., to manufacture electrical control instruments and parts.

Kolster Radio, Inc., 360 Thomas Street, Newark, N. J., manufacturer of radio sets, parts, etc., is increasing production and has added more than 300 employees to its force during past fortnight. Company is a subsidiary of International Telephone & Telegraph Corp., 67 Broad Street, New York.

Commanding Officer, Pictinny Arsenal, near Dover, N. J., asks bids until May 2 for seven routing milling machines (Circular 306); one resizing press for cartridge cases (Circular 307).

Thomas J. Lee, Inc., 495 Lyons Avenue, Irvington, N. J., plumbing equipment and supplies, will take bids in May for two-story and basement storage and distributing plant, 50 x 200 ft., with pipe shop and other mechanical departments. Cost over \$50,000 with equipment. Neil J. Convery, 32 Walnut Street, Newark, is architect.

Bureau of Yards and Docks, Navy Department, Washington, asks bids (no closing date stated) for automatic refrigerating plant for naval air station, Lakehurst, N. J. (Specification 6833).

International Business Machines Corp., 270 Broadway, New York, and Binghamton, N. Y., leased four-story building, 40 x 100 ft., at 720-22 North Broad Street, Philadelphia, for new factory branch, storage, distributing and sales unit for all subsidiaries.

Bureau of Supplies and Accounts, Navy Department, Washington, and Navy Yard, Philadelphia, asks bids until May 10 for 68 metal propeller hubs (Schedule 7888).

Panther Valley Water Co., Tamaqua, Pa., operated by Lehigh Coal & Navigation Co., 1421 Chestnut Street, Philadelphia, plans installation of water system for Panther Creek Valley district, including 250,000 gal. dam on Still Creek, a tributary of Schuylkill River.

near Tamaqua, power and pumping equipment, and main pipe line, 36-in. diameter, 5 miles long. Cost \$250,000. Gannett, Seelye & Fleming, Harrisburg, Pa., are engineers.

Scranton School District, Scranton, Pa., plans manual training department in three-story and basement junior high school for which bids will be received on general contract May 9. Cost about \$1,200,000. Tudor R. Williams, Scranton Life Building, architect and engineer.

J. Howard Fritz Co., Inc., Reading, Pa., has been organized by J. Howard Fritz, 520 Elm Street, to manufacture heating, ventilating and kindred equipment.

Carborundum Co., Niagara Falls, N. Y., manufacturer of abrasive products, grinding wheels, etc., let general contract to Gardner Construction Co., Welland, Ont., for two additions to plant at Niagara Falls, Ont., operated as Canadian Carborundum Co., one unit to be used for mixing and kindred service, and other for fabricating abrasive products. Cost about \$225,000 with equipment.

Board of Education, City Hall, Buffalo, asks bids until May 10 for metal storage cabinets for manual training departments in various schools.

Watkins Body Corp., Buffalo, has been organized to take over Watkins Commercial Body Corp., 666 Genesee Street, manufacturer of motor truck and other automobile bodies.

Cohoes Rolling Mill, Cohoes, N. Y., is discontinuing production of wrought iron pipe, in which it has been engaged for 78 years, and will confine operations to galvanizing, cutting, finishing and other pipe divisions.

◀ SOUTH ATLANTIC ▶

McArdle & Walsh, Inc., 112 West North Avenue, Baltimore, pipe, pipe fittings, etc., has leased one and two-story building at 1307-19 Maryland Avenue, 18,000 sq. ft. floor space, for new storage and distributing plant, with pipe-fitting and other shops. Present plant will be removed to new location.

Board of District Commissioners, District Building, Washington, asks bids until May 3 for power panels for Anacostia bridge span draw; until May 9 for metal fixtures and fittings for top of lamp-posts; until May 16 for cast iron parts for lamp-posts, including shafts, bases and castings.

Potomac Edison Co., Hagerstown, Md., will make extensions and improvements in plants and system in Hagerstown and Frederick districts, including transmission lines, replacing recent damage by storms. Cost about \$250,000 with equipment.

General Purchasing Officer, Panama Canal,

STURDY?-it had to be sturdy to survive this blow!



IT takes a strong "he-man" pipe to stand the gaff in the rugged Rocky Mountain country. Armco Spiral Welded Pipe is fit, if this trying experience in the San Antonio Canyon of California is any indication

Not long ago a large boulder broke away from its moorings 150 feet up the side of the canyon, rolled down the steep incline and landed squarely on the exposed Armco Spiral Welded Pipe with a terrific impact. Was the pipe crushed flat? Did the spiral weld give way? Did the pipe burst? No, sir! The weld held firmly and there was no visible injury except distortion.

But Armco Spiral Welded Pipe can offer you more than great strength and flexibility. Its initial cost is low. It is true-round, rifle-straight, easy to handle; costs less to install than most other types. Also consider that its smooth interior insures free flow, full discharge, and lower pumping costs.

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Just how will your pipe cut our installation costs, step up efficiency, and yield worth-while savings in actual performance? Also send along a free copy of your useful handbook.

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City State

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ARMCO
SPIRAL WELDED
PIPE

Send for a free copy of our useful handbook

Washington, asks bids until May 11 for equipment for jacking and rolling system for repairing miter gate bearings of canal locks; also for pumping unit, flexible copper pipe, forged steel pipe fittings, etc. (Schedule 2746).

Department of Public Works, City Hall, Richmond, Va., B. Keith Compton, director, asks bids until May 4 for two-story municipal transit shed and warehouse unit, steel frame and sides, 77 x 228 ft., along municipal wharf.

Riverside Foundry & Machine Works, Inc., Palatka, Fla., plans installation of two or more electric hoists, 3 to 5-tons capacity, or electric traveling crane of similar capacity.

Bureau of Yards and Docks, Navy Department, Washington, asks bids until May 11 for steam kettles, sheet metal hoods, corrosion-resisting steel kitchen equipment, sheet metal sinks, etc. for Naval Academy, Annapolis, Md. (Specification 6856).

Andrew Coal Co., Granville, near Morgantown, W. Va., plans rebuilding of tippie at coal properties, recently damaged by fire.

E. C. Otis Mfg. Co., Chester, W. Va., is completing erection of new plant on Pan Avenue for manufacture of heavy roofing papers, to replace factory at Toronto, Ohio, destroyed by fire. Initial unit represents cost of over \$50,000. Additional equipment will be installed later.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 3 for one oxygen gas holder tank, 20,000 cu. ft. capacity (Schedule 7917) for Norfolk Navy Yard, for transmitting equipment (Schedule 7830); until May 10 for quantity of soot blower units (Schedule 7941) for Norfolk and Mare Island yards; until May 17 for motor-driven testing machine (Schedule 7790).

◀ NEW ENGLAND ▶

American Steel & Wire Co., 238 Fairmont Avenue, New Haven, Conn., has plans for one-story addition to local plant.

Huntington Paper Co., Huntington, Mass., recently organized by Ralph M. Snell, vice-president, Hurlbut Paper Co., South Lee, Mass., and associates, has taken over former Chester Division paper mill of American Writing Paper Co., Holyoke, Mass., for manufacture of high-grade papers. Improvements will be made, including remodeling and reconditioning of machinery. Mr. Snell will be president of new company; Frank A. Juckett, president of Hurlbut Paper Co., will be vice-president.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 3 for one motor-driven turret lathe for Boston Navy Yard (Schedule 7887).

Fitchburg-Leominster Airport Corp., 84 Prospect Street, Leominster, Mass., Barton Crocker, in charge, has plans for airport, including hangars, repair and reconditioning shop and other field units. Cost over \$65,000 with equipment. Gavin Hadden, 607 Fifth Avenue, New York, is engineer.

E. Ingraham Co., Bristol, Conn., manufacturer of electric clocks, watches, etc., is increasing capacity in all departments. Watch division is running on basis of 3000 units daily, as compared with 2000 watches a day about three months ago. Spring clock division is operating close to normal, with production in some departments behind orders; electric clocks are being manufactured on high schedule, including clock-motor manufacturing division.

Fritzell Foundry & Casting Co., New Haven, Conn., has been organized by officials of Excell Foundry & Machine Co., same place, to take over and operate Fritzell Foundry division of that company, for production of brass, bronze and kindred metal castings. Oscar and Paul Fritzell head new organization.

Department of Hospitals, Commonwealth of Massachusetts, Boston, let general contract to John Bowen Co., Inc., 129 Newbury Street, for addition to power plant at city hospital, including improvements in present unit. Cost about \$250,000 with equipment. James H. Ritchie & Associates, 100 Arlington Street, are architects.

Board of School Trustees, Hamden, Conn., will ask bids on general contract early in June for two and three-story high school, to include complete vocational training shops. Cost over \$500,000 with equipment. R. W. Foote, 185 Church Street, New Haven, Conn., is architect; Walter R. McCornack, 10006 Carnegie Avenue, Cleveland, consulting architect.

◀ CENTRAL DISTRICT ▶

Wendall August Forge Co., Brockway, Pa., manufacturer of aluminum and other metal forgings, has plans for one-story plant, 60 x 160 ft., at Grove City, Pa., and will remove to new location.

Pennsylvania Gas Co., Roystone, near Sheffield, Pa., operating natural gas properties, plans rebuilding machine shop recently destroyed by fire.

Sears, Roebuck & Co., Chicago, have leased four-story building at Twenty-ninth Street and Liberty Avenue, Pittsburgh, 70,000 sq. ft. floor space, for new branch storage and distributing mail order plant.

Lindlay Coal Co., Houston, Pa., plans rebuilding tippie at coal-mining properties recently destroyed by fire. Loss about \$40,000 with machinery.

City Council, Erie, Pa., is considering a municipal electric light and power plant. A. N. Aitken, City Hall, is engineer.

Erie Casket Co., 1901 Sasfras Street, Erie, Pa., let general contract to E. E. Austin & Son, 1919 Reed Street, for new plant unit, 70 x 130 ft. Cost about \$45,000 with equipment. Meyers & Johnson, Commerce Building, are architects.

Standard Oil Co., Midland Bank Building, Cleveland, let general contract to Austin Co., 16112 Euclid Avenue, for one-story addition, 30 x 65 ft., to bulk oil storage and distributing plant.

Columbus Railway, Power & Light Co., Columbus, Ohio, has arranged for new bond issue of \$4,500,000, part of proceeds to be used for extensions and improvements. Company plans acquisition of Point Pleasant Water & Light Co., and River Counties Power Co., and has purchased Southern Ohio Power Co. Extensions will be made in transmission lines.

Gas-Electric Heater Co., Toledo, Ohio, care of Wolfe & Rogers, 1328 Nicholas Building, has been organized by Roland H. Rogers and associates, to manufacture heaters and heating equipment.

T. J. Lane Co., Springfield, Ohio, plans purchase of a stiff leg derrick, 60-ft. boom, with bucket, etc.

Cincinnati Union Terminal, Temple Bar Building, Cincinnati, asks bids until May 10 for six-track reinforced-concrete coaling station with ash-handling system; overhead storage capacity of 1600 tons coal, and other storage facilities for about 250 tons wet sand and 50 tons dry sand, with mechanical equipment.

Edwards Mfg. Co., 527 East Fifth Street, Cincinnati, manufacturer of sheet metal, iron and steel products, has arranged through its president, Howard W. Edwards, for purchase of John Van Range Co., Oakley, manufacturer of kitchen and food service equipment, in receivership. Purchasing interests have incorporated new company of same name to operate Van Range plant, which will be continued. Howard W. Edwards will be president and treasurer and Oliver S. Larkby, vice-president and secretary. Warren G. Brown is vice-president and general manager.

Constructing Quartermaster, Patterson Field, Fairfield, Ohio, asks bids until May 11 for gasoline fueling system at Lunken Field, Cincinnati.

West Carrollton Parchment Co., West Carrollton, Ohio, let general contract to Charles H. Shook, Third National Bank Building, for extensions and improvements in paper mill.

Department of Public Utilities, Division of Water and Heat, Cleveland, plans early call for bids for two steel storage water tanks, one at Euclid, capacity 1,000,000 gal., and other at Garfield Heights, capacity 3,000,000 gal. Arthur R. Brueggeman is director.

Contracting Officer, Materiel Division, Wright Field, Dayton, Ohio, asks bids until May 2 for quantity of metallic pump packing (Circular 361); until May 4 for three air blowers (Circular 364), 125 CO. fire extinguishers (Circular 362), quantity electric storage batteries (Circular 366); until May 10 for 20 gun mount adapter assemblies and 20 gun mount assemblies (Circular 363).

Schroeder Mfg. Corp., Huntington, Ind., has been organized by Henry L. Schroeder and Edwin A. Arveson, Huntington, to manufacture bakers' machinery and tools.

Engman Electric Screen Co., Goshen, Ind., has been organized by Harry A. Engman, Jr., and Herbert A. McDougall, Goshen, to manufacture electric screens and kindred equipment.

Corunna Mfg. Co., Corunna, Mich., recently organized, has purchased one of two local plants of Weatherproof Body Corp., manu-

facturer of automobile bodies, recently liquidated, and will occupy for similar line of production. Fred D. Ritter is head.

Continental-DeVaux Co., Grand Rapids, Mich., manufacturer of automobiles, is running on a 9-hr. day, six-day week basis. Production schedule will be increased in May.

Standard Oil Co., River Rouge, Detroit, is contemplating new bulk oil storage and distributing plant at Birmingham, Mich.

State Hospital Commission, Lansing, Mich., C. F. Sundstrom, chairman, plans addition to power house, water and electric lighting plants at institution at Newberry. Bids will be asked early in May. Cost over \$70,000 with equipment. Derrick Hubert, Menominee, Mich., is architect.

Consolidated Stamping Co., 2755 West Fort Street, Detroit, has been organized by Abraham Vizvary, 79 Eason Avenue, Highland Park, Mich., and associates to manufacture steel stampings and other metal products.

Accuralite Co., Muskegon, Mich., manufacturer of pistons, piston rings, etc., has advanced production to 55 hr. weekly, with full working force. Sales are averaging 50 per cent in excess of those in February.

General Motors Truck Co., Pontiac, Mich., affiliated with Yellow Truck & Cab Co., same place, has secured order for 60 passenger buses for use at Chicago Century of Progress Fair, 1933, totaling \$300,000, to be operated by Greyhound Management Co., Chicago.

Freeman Quadrive Corp., Detroit, manufacturer of four-wheel drive motor trucks, has taken over former plant of Eaton Axle & Spring Co., Pontiac, Mich., and will remove to that location. Company is arranging for sale of stock issue of about \$500,000 for expansion. Maurice Bollstrom is president and manager.

Hodges Tool & Mfg. Corp., Grand Rapids, Mich., has been organized by Sylvanus W. Hodges, 331 Ionia Avenue, N. W., and associates, to manufacture tools and metal products.

◀ MIDDLE WEST ▶

Signal Corps, Procurement District, 1819 West Pershing Road, Chicago, asks bids until May 10 for quantity of coils, crank clips, crossarms, etc. (Circular 50), for two loading coil cases (Circular 51).

Cardinell Vellum Mfg. Co., 15 Label Street, Montclair, N. J., manufacturer of parchment and tracing paper stocks, etc., has plans by Holabird & Root, 333 North Michigan Avenue, Chicago, architects, for one and two-story plant at Chicago. Cost about \$55,000 with equipment.

Simplex Door Co., 612 Michigan Avenue, Chicago, has been organized to take over and expand company of same name, to manufacture fire doors, gates and kindred products. Harold A. Schweig and Lester F. Wellman head new company.

City Council, Ames, Iowa, is planning extensions and improvements in municipal electric light and power plant, including new generator unit and auxiliary equipment.

City Council, Duluth, Minn., has authorized extensions and improvements in municipal pumping plant. Cost about \$40,000 with machinery. C. H. Smith, Torrey Building, is architect.

United States Engineer Office, 333 North Michigan Avenue, Chicago, asks bids until May 18 for electrical power, control and indicating equipment, lock signals, electric cable, connection boxes, potheads and accessory equipment for Brandon Road lock, Des Plaines River, near Joliet, Ill. (Circular 18).

City Council, Morris, Minn., has engaged Robert J. Torrens, Shubert Building, St. Paul, Minn., consulting engineer, to make surveys and plans for municipal electric light and power plant. Cost about \$150,000 with machinery.

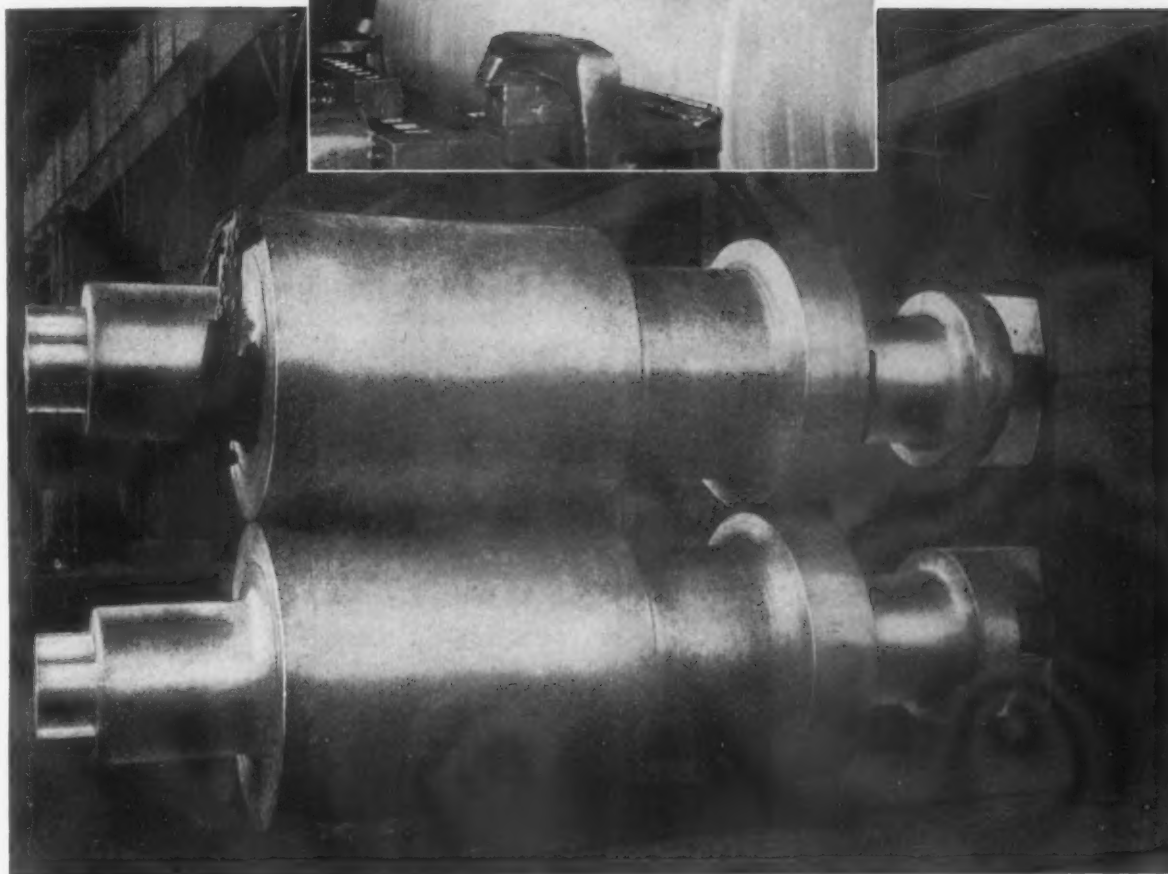
Standard Oil Co. of Indiana, 910 South Michigan Avenue, Chicago, is considering new bulk oil storage and distributing plant on Front Street, near Kaw Avenue, Butte, Mont. Cost about \$50,000 with equipment.

J. W. Hubbard Co., Chicago, has been organized by Elmer Engquist, Alfred G. Johnson and associates, to take over and expand J. W. Hubbard & Co., 407 South Dearborn Street, manufacturer of packing house machinery and parts.

City Council, Bedford, Iowa, is planning municipal electric light and power plant. Cost about \$100,000. Special election will be held soon to approve bond issue in that amount.

John Morrell & Co., Ottumwa, Iowa, meat packers, have asked bids on general contract

MESTA ROLLS



Chilled Rolls Alloy Iron Chilled Grain Rolls
Alloy Iron Fine Grain Rolls Sand Rolls
Mesta Hardened Rolls Mesta Hardened Chilled Rolls
Carbon Steel Rolls Alloy Steel Rolls
Mesta Special Alloy Steel Rolls Heat Treated

MESTA MACHINE COMPANY

Pittsburgh, Pa., U. S. A.



for six-story and basement addition, 120 x 160 ft. Cost over \$300,000 with equipment. H. P. Henschien, 59 East Van Buren Street, Chicago, is engineer.

Board of Water Commissioners, city and county of Denver, asks bids until May 11 for machinery for new University Park pumping plant, including one centrifugal pump of 20,000,000 gal. daily capacity, two 15,000,000 gal., two 10,000,000 gal., and one 5,000,000 gal. daily capacity, all with motors ranging from 800 to 200 hp.

Board of Commissioners, City Hall, Williston, N. D., asks bids until May 9 for equipment for municipal waterworks, including three motor-driven pumping units, 3000, 900 and 800-gal. a min. capacity, respectively; chemical dry feed machinery, filter equipment, piping, valves, mixing tanks, controllers, sludge-removing machinery and complete accessory equipment. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is consulting engineer.

James P. Marsh & Co., 2073 Southport Avenue, Chicago, manufacturer of valves, gages and kindred steam specialties, has changed its name to Chicago Valve & Gauge Co.

Allsteel Press Co., 1215 South Peoria Street, Chicago, has received an order from Metal Forms Corp., Milwaukee, for a double-crank triple-gear twin-drive press, with bed area of 48 x 140 in.; shaft diameter 9 in.; shut height to top of bolster 20 in.

Rasmann Mfg. Co., Beaver Dam, Wis., manufacturer of agricultural machinery, has taken over production on royalty basis of sugar beet harvesting machine designed by John A. Mueller, Milwaukee, and developed in cooperation with Davis & Thompson Co., Milwaukee, manufacturer of special machinery and tools.

E. E. Clemons, a stockholder, has instituted receivership proceedings against Northern Conveyor & Mfg. Co., Janesville, Wis. George DeBruin, secretary, Rock County Savings & Trust Co., has been appointed receiver. Edgar J. Leach, Janesville, formerly with American Austin Co., has been engaged as manager of property, which will be continued in operation.

◀ SOUTHWEST ▶

Board of Public Utilities, Kansas City, Kan., asks bids until May 11 for 6000-hp. watertube boiler and auxiliary equipment for municipal electric light and power plant. Cost over \$200,000. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., consulting engineer.

Beck Engineering Co., St. Louis, recently organized by V. S. Beck and associates, has arranged for present headquarters at plant of Langenberg Mfg. Co., 4525 North Euclid Avenue, manufacturer of furnaces, burners, etc., where machine work and castings will be handled for new line of gas burners. Local assembling division will be operated.

Consumers Ice Co., Tyler, Tex., has plans for three electric-operated ice-manufacturing and refrigerating plants at Muskogee, McAlester and Sapulpa, Okla. Cost over \$140,000 with machinery. G. E. Wells, Inc., Security Building, St. Louis, is engineer.

State Highway Commission, Jefferson City, Mo., T. H. Cutler, chief engineer, asks bids until May 3 for new county equipment storage and distributing buildings at Shelbyville, Troy, Poplar Bluff, New Florence, Van Buren, Neosho, Rosebud and Arcadia, Mo. Repair and maintenance departments will be installed.

General Aggregate Corp., St. Louis, recently organized by Claude H. Hunsaker, 501 Perdue Street, and associates, is considering new plant for manufacture of patented aggregate using blast furnace slag as base material, including mixing, heating, cooling, storage, loading and other departments. Cost over \$100,000 with machinery. Company will operate with capital of \$500,000.

State Highway Commission, Topeka, Kan., Guy T. Helvering, director, let general contract to Benjamin Keith, Uniontown, Kan., for new one and two-story division shop, 60 x 140 ft., at Chanute, Kan. Cost about \$30,000 with equipment. Joseph W. Radotinsky, State House, Topeka, is State architect.

Union Oil Co., Seventeenth and Iron Streets, Kansas City, Mo., has plans for three-story addition to bulk oil storage and distributing plant. Cost over \$65,000 with equipment.

Texas Elf Carbon Co., Pampa, Tex., plans rebuilding part of plant recently destroyed by fire. Loss close to \$100,000 with machinery.

Valley Refining Co., Wichita Falls, Tex., James E. Campbell, secretary and treasurer, has approved plans for new oil refinery at McAllen, Tex., including units for production of

lubricating oils. Cost over \$200,000 with machinery.

Petroleum Machine & Foundry Co., San Antonio, Tex., has been organized by Claude Usary and J. B. Temple, San Antonio, to manufacture oil well machinery, castings, etc.

State Highway Department, Austin, Tex., will build one-story equipment storage and distributing plant, 62 x 122 ft., at Amarillo, Tex. Cost about \$24,000 with equipment.

Anderson, Clayton & Co., Cotton Exchange Building, Houston, Tex., operating cotton storage and distributing plants, have acquired property at Caruthersville, Mo., as site for new plant unit, with installation of conveying, loading and other equipment. Cost over \$50,000 with equipment.

◀ SOUTH CENTRAL ▶

Louisville & Nashville Railroad Co., Louisville, let general contract to Foster & Creighton Co., Protective Life Building, Birmingham, for service and operating building at Birmingham. Cost about \$70,000 without equipment. W. H. Courtenay, Louisville, is chief engineer.

Williams Coal Co., Mannington, Ky., plans rebuilding power house at coal mines near Mannington, recently partially destroyed by fire.

United States Engineer Office, Memphis, Tenn., asks bids until May 6 for three 15-in. pumping units for handling sand and gravel. (Circular 605).

Butler Brothers, 500 Minnesota Building, St. Paul, Minn., have plans for new works near Pratt's Station, Barbour County, Ala., for production of Fuller's earth, including mining, refining, storage, loading and other mechanical equipment. Cost about \$30,000 with machinery. C. C. Ruprecht, Clayton, Ala., is in charge.

Louisiana Distributing Co., Abbeville, La., recently organized as a subsidiary of Pure Oil Co., 35 East Wacker Drive, Chicago, plans bulk oil storage and distributing plant at Abbeville. Cost over \$75,000 with equipment.

Orleans Levee District, 606 Common Street, New Orleans, let general contract to Caldwell Brothers, 816 North Howard Avenue, for two hangars, each 125 x 197 ft.; one-story machine and repair shop, 100 x 122 ft.; storage and distributing building and electric transformer house, 60 x 130 ft., and two-story administration building, 70 x 290 ft., at new Shushan municipal airport, Lake Pontchartrain, at \$408,783, exclusive of equipment. National Airport Engineering Co., Ltd., 775 East Washington Boulevard, Los Angeles, is engineer; John Klorer is chief engineer for district.

Hendrix Foundry Co., Birmingham, has been reorganized as Commercial Castings & Mfg. Co. R. J. Bell has become associated with L. A. Hendrix in new company. Plant has been moved from Irondale to North Birmingham.

◀ PACIFIC COAST ▶

Mohawk Petroleum Co., 405 Montgomery Street, San Francisco, has awarded general contract to Southwestern Engineering Corp., 4800 Santa Fe Avenue, Los Angeles, for new oil refinery at Fruitvale, Cal. Cost over \$150,000 with equipment. Engineering department of company, Bakersfield, Cal., is in charge.

Bullard Irrigation District, Fresno County, Cal., care of A. Segel, Cory Building, Fresno, consulting engineer, plans installation of electric-operated pumping machinery and accessory equipment, pipe lines, etc. Cost about \$30,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until May 10 for six gasoline engine-driven generating sets (Schedule 7894); until May 3, for ammeters, voltmeters, etc. (Schedule 7858) for Mare Island Navy Yard.

El Dorado Oil Works Co., 230 California Street, San Francisco, let general contract to Barrett & Hilp, 918 Harrison Street, for new one-story coconut oil plant, 100 x 600 ft., at Oakland, Cal., with adjoining one-story unit for storage and distribution, 40 x 400 ft. Cost over \$400,000 with equipment.

Oil Well Gas Control Corp., Los Angeles, care of Samuel Wolf, 1108 Quinby Building, has been organized by L. Ryan and Leo Shapiro, and associates, to manufacture oil well equipment.

State Board of Control, Capitol Building, Salem, Ore., William Einzig, secretary, asks bids until May 12 for power plant and electrical distributing system for local State

institutions, including three full Diesel engines with generating units, one generator 180-kw., and two 200 kw. capacity, respectively, one gas engine-operated air compressor, one motor-driven air compressor, 15,000-gal. capacity fuel oil storage tank, 150-gal. capacity storage tank for day storage, switchboard and instruments, Diesel engine parts, overhead traveling crane, pole lines, pipe lines, cable, etc., for distribution system. Cost about \$150,000.

Bureau of Water and Power, 207 South Broadway, Los Angeles, has plans for a two-story power substation at West Hollywood. Cost about \$300,000 with equipment. H. A. Van Norman, chief engineer.

◀ FOREIGN ▶

Bureau of Yards and Docks, Navy Department, Washington, will carry out expansions at aviation field near Schofield Barracks, Wheeler Field, Honolulu, T. H., including parachute and other mechanical aircraft shops, radio equipment building, automobile service and repair units and other structures. Cost about \$150,000 with equipment.

La Compagnie Anonyme Microne, Paris and Toulouse, France, manufacturer of automobiles, is considering new assembling plant at Montreal, Que., for production of Microne one cylinder cars, front-wheel drive, weighing about 700 lb. with equipment. Cost about \$100,000 with machinery.

Cuban American Manganese Corp., 122 East Forty-second Street, New York, affiliated with Freeport Texas Co., same address, has work under way on new plant and development of manganese properties near Santiago, Cuba. Cost over \$200,000 with equipment.

Benquet Consolidated Mining Co., Baguio, Philippine Islands, operating Antamok-Balatak gold mines, is planning installation of additional equipment, including new 3000-hp. power plant, steam-operated or hydroelectric power type, on Agno River. Cost over \$150,000. Judge John W. Haussermann, head of company, will soon come to United States to make equipment purchases. Company has San Francisco office in Hobart Building.

Ministry of Industries, Government of China, Shanghai, has authorized erection of iron and steel works in Anhwei Province, including blast furnace, rolling mills, foundries, forge, machine and other shops. Cost over \$9,000,000. Plant will be built under direction of Gutehoffnungshuette Aktien Verein fuer Bergbau & Huettenbetrieb, Sterkrade, Rheinland, Germany, structural engineers.

Trade Notes

Gunn, Carle & Co., reinforcing bar and building material contractors at San Francisco, have moved their general offices from 444 Market Street, to their warehouse at 20 Potrero Avenue.

Lincoln Electric Co., Cleveland, are welding equipment, has appointed La Consolidada, S. A., Mexico, D. F., a leading Mexican steel company, as distributor for its products in Mexico.

Taft-Peirce Mfg. Co., Woonsocket, R. I., has appointed Arthur H. Hall, 133 South Thirty-sixth Street, Philadelphia, as its sales representative in that district for the company's line of gages, production and inspection tools and magnetic chucks.

Oliver Brothers, Inc., resident wholesale buyer of hardware, mill supplies, etc., has moved its offices from 71-73 Murray Street to 200 Hudson Street, New York.

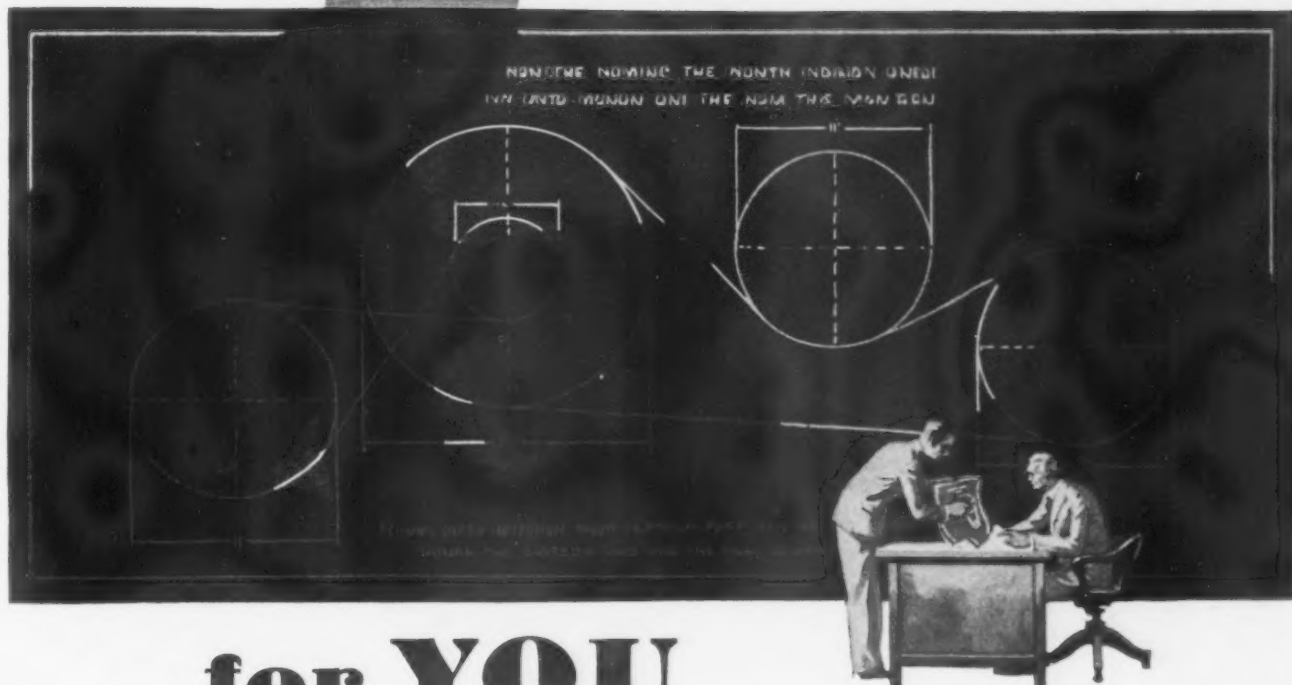
Shawinigan Products Corp. has removed its offices to Empire State Building, New York.

Geometric Stamping Co., Cleveland, has appointed E. F. Wilmot, E. F. Wilmot Co., 62 Ridgmont Street, Boston, as its Boston representative, and H. A. Bell, Third National Bank Building, Dayton, Ohio, as its representative in the Dayton and Cincinnati districts.

Safety Grinding Wheel & Machine Co., Springfield, Ohio, has removed its Eastern office to 1508 West Allegheny Avenue, Philadelphia.

Barber-Colman Co., Rockford, Ill., manufacturer of milling cutters, hobs, reamers and allied machinery, has established an office in Pittsburgh, which will be in charge of William G. Taphorn. Mr. Taphorn was formerly in the Chicago office of the company, where he acquired several years of experience in selling Barber-Colman machines and small tools after having served a number of years in the plant in Rockford.

A MAN with an IDEA



for YOU

HE HAS BROUGHT money-making and money-saving ideas to owners and operators of many industrial plants all over the world, has the G.T.M.—Goodyear Technical Man.

His specialty is rubber, as applied to power transmission, conveying, elevating, bigger work, faster work, cleaner work in thousands of plants and scores of industries. He is an

expert on rubber, with a practical knowledge of operating conditions in many industries.

Here on this page you see suggested typical operations in which G.T.M.-specified Goodyear Mechanical Rubber Goods are delivering better service, more trouble-free service, at lower cost—which, after all, sums up to more profit in any operation.

In the cases illustrated, and in many, many more, the G.T.M., functioning on the Goodyear Plant Analysis Plan, contributed a sound, scientific idea which meant money to the owner or operator.

Might he not do as much for you? Then why not get in touch with him? A line, or a call, to Goodyear, Akron, Ohio, or Los Angeles, California, will bring the G.T.M.

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Goodyear Dredge Sleeves are factors in many successful dredging operations in all the waters of this continent. Being scientifically designed, constructed and specified for this duty, they give an excellent account of themselves wherever they are employed.

TUNE IN:

Goodyear invites you to hear the Revellers Quartet, Goodyear Concert - Dance Orchestra and a feature guest artist every Wednesday night over N. B. C. Red Network, WEA and Associated Stations



The very largest coal conveying operations in this country are done on Goodyear Conveyor Belts. These belts, scientifically designed, constructed and applied to their work, have a record for outlasting others by as much as millions more tons carried and years more of service.

Specialized Deep Drawing in Zinc— Making a 6-in. Dry Cell Battery Can

(Concluded from page 971)

of the reductions exceeding the limits the metal would stand without being stretched or fractured.

The series of operations, six in number, consisted of first a draw, then five redraws, and a trimming operation which is combined with the final redrawing operation. The length, diameter and thickness of the finished can to be produced being a known factor, as well as the number of operations decided upon, an explanation of the dies, and their construction and design, is in order.

Blank Is 8½ In. in Diameter

A start was made by first deciding on the size of blank, making allowance for sufficient zinc for trimming between the first and final redrawing operations. A blank 8½ in. in diameter was used and this permitted a trimming operation at the third redraw and a final trim in connection with the last redrawing operation in which the can or shell is drawn to the desired length.

Before going into detail regarding the dies air pressure should be considered, as air pressure must be used on all draws. For the first draw an air pressure of 35 to 40 lb. per sq. in. was found suitable and for all redraws a pressure of from 5 to 10 lb. per sq. in. Much depends upon the perfection of the first drawing operation, which must produce the drawn shell free from any sign of a wrinkle, and it must be of the same uniform thickness as the metal prior to being drawn. The success of the redraws is contingent on the perfection of the first draw. To obtain a piece after the first draw free from wrinkles and of the same thickness throughout as the blank, much depends on the depth and diameter of the first draw. While the diameter decided to be drawn governs the depth, it is essential to determine a diameter for the first draw that will permit the blank to be held under the necessary pressure to keep the shell from wrinkling and to avoid stretching the metal while drawing.

Die for First Draw Made to Close Limits

The die for the first draw was built to very close limits, and all working and important parts were ground and in some cases were lapped and highly polished. The punch holder was machined to dimensions

suitable to permit a draw punch ring to be attached or removed in 2 or 3 min. Interchangeable parts were made and ground to such limits that this was made possible. The punch draw ring was ground so that the back and face were perfectly true with the internal ground and lapped surface. The drawing angles and the draw edge radii were ground at the same setting for grinding the internal diameter. The die shoe was made from special machine steel machined to very accurate dimensions and bored to receive a forming-stake stud bar or arbor. This was made from a special steel and left soft. It was machined to fit the bore for this purpose in the die shoe. In machining the stud bar a shoulder was provided and the end was threaded to permit the stud to be securely fastened to the die shoe by a lock nut below the shoe.

The purpose of the forming stake stud was for the assembly or replacement of the hardened and ground hollow forming stakes. A provision was made whereby these stakes could be securely fastened to the forming stake stud with a specially designed locking screw that would permit the removal or replacement of the hollow forming stakes at any time necessary without moving the die and to make it unnecessary to have to reset the dies. In fact, all the dies were so designed that any of the working parts could be removed or replaced whenever necessary.

How Blank Holder Was Made

The blank holder was made from a forging of special steel and was designed to take care of two very important conditions; (1) a long sliding surface was provided to insure a perfect sliding motion in connection with the length of travel necessary up and down the forming stakes and (2) a provision was made whereby the diameter of the blank holder was left large enough and thick enough so that it could be rough-turned in depth and diameter to permit the installation and operation of a blank locating ring. This ring was to make sure that the blank was centrally located on the die or blank holder.

After the blank holder referred to had been machined or turned to a certain depth and diameter and bore it was heat treated and ground to meet the special requirements for

which the blank holder was designed. When it is stated that the blank holder was turned or rough-turned to a certain depth and diameter it should be understood that sufficient stock was left for grinding the diameter and also the depth. The diameter in this case means the diameter of the blank and the depth means that sufficient metal has been removed from the face of the draw ring to permit the blank locating ring to travel deep enough so that no obstruction could interfere with the desired pressure on the blank. The blank locating ring was operated by springs so that this ring could stand high enough above the face of the draw ring to permit perfect feeding and locating the blanks.

Special Packing Nuts Installed in Bed Plates

Another feature that was installed in the bed plates of the presses was special graphite packing ring nuts. While these were installed for one purpose, it was discovered that they were useful for another purpose, a purpose in a way unusual and to some extent important, especially when dies have to work month after month as these dies did.

One of the reasons for installing these packing nuts was the fact that the presses the writer recommended as most suitable for drawing and redrawing the zinc battery shells were machines especially built by the E. W. Bliss Co. These are single-crank tie-rod construction type of presses, with the most modern built-in features particularly adapted for the work and provided with all the improvements engineering skill has made possible. The design of the built-in type of press made it possible to install the latest type of air cushion equipment, that of the Marquette Air Cushion Co. There is no doubt that the presses used for this work, together with the air cushions, played an important part in making the successful drawing of this can possible.

The graphite packing nuts previously referred to were used to prevent any of the drawing compound solution from running through to the air cushion chamber which the built-in type of press really is. But apart from this it was discovered, by using the same holes in the bed plate that were used for the compression pins for installing the graphite nuts, that the graphite packing furnished a wonderful lubricating system for the compression pins, as the graphite packing not only kept the pins to a snug sliding fit at all times but prevented any possible danger that the


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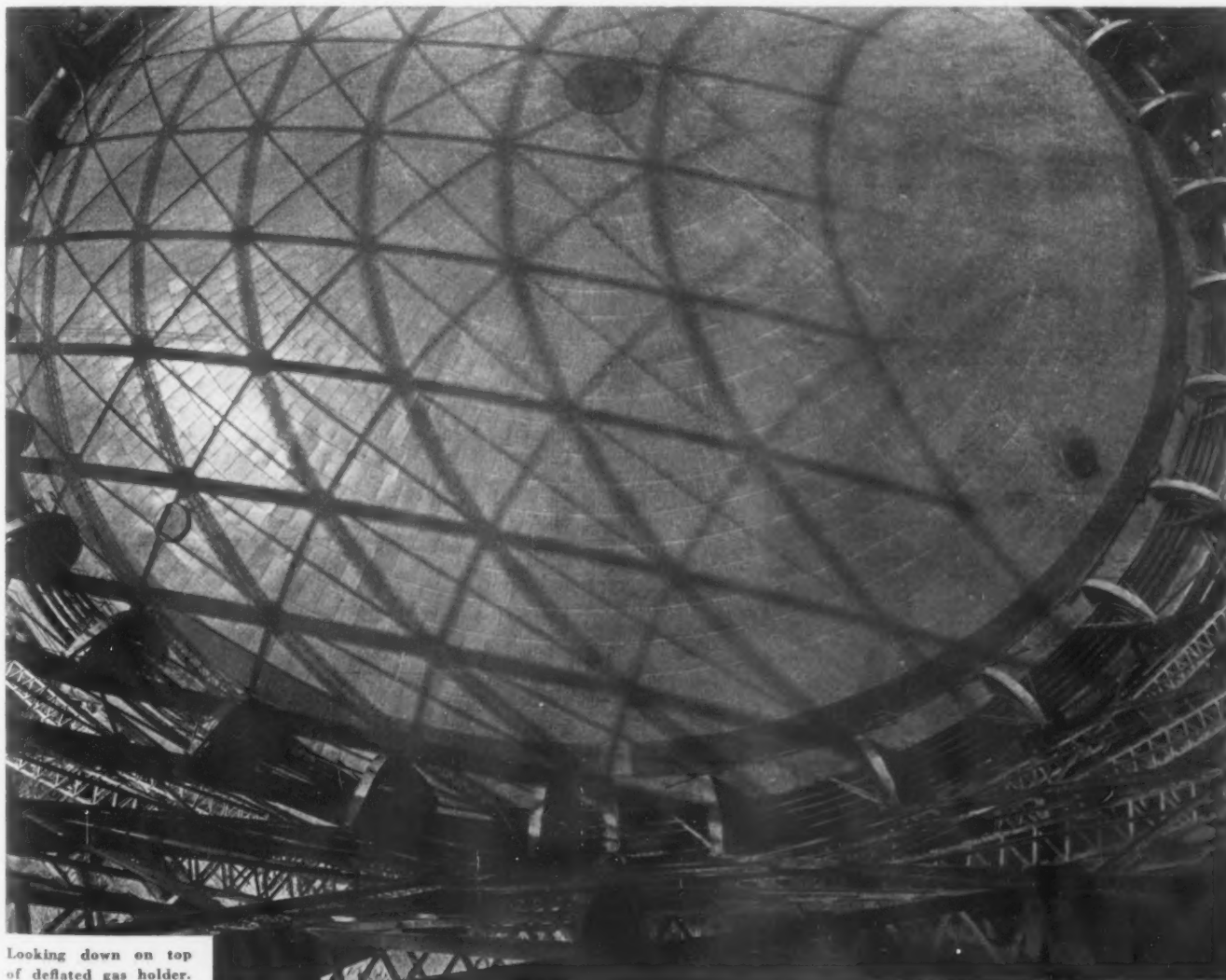
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Looking down on top of deflated gas holder.

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compression pins would score or wear through the continual sliding motion at every revolution of the press.

Fit of Draw Ring Over Forming Stake Important

Having explained the development and experience up to the point which includes the presses and air pressure equipment, the writer will now take up the subject respecting the design and importance of what is termed the hollow draw ring type of redraw dies that are necessary for successfully drawing and redrawing zinc from the light-gage material specified and for the purpose designated.

The importance of the redraw being made under pressure requiring 5 lb. to 10 lb. per sq. in. has already been explained. Up to and including the last redraw all the redraw dies are practically the same in design and construction with possibly the exception of the last redraw, the shell being redrawn and trimmed to the desired length and, much like the first drawing operation, all parts being made interchangeable so that any part could be removed without having to reset the dies. The hollow draw ring was ground to a perfect sliding fit on the forming stake, the outside diameter of this hollow redraw ring being ground to receive the shell to be redrawn. While it is important that the shell to be redrawn must be a perfect fit over the hollow draw ring, yet the operator must be able to put the shell on easily without having to force or knock it down with his hand. The hollow draw ring is fitted into a plate large enough in diameter so that it will cover the compression pins. All working parts must be ground to a perfect fit and specifications and must be in positive alignment. The principal reason for this was for producing a more even draw eliminating practically all possibility of any excess metal accumulating from any unevenness during the drawing operation, for this unevenness might easily happen in drawing zinc. The knowledge gained while conducting and engineering this development emphasizes the importance of the ground fits and alignment.

Trimming Die Easily Replaced

The redraw die embodying the trimming operation was also designed whereby even the trimming die could be easily removed or replaced. In connection with all the dies a cylindrical cover was provided which acted as a positive stop for preventing the blank holder or the hollow draw rings from being drawn up with the up motion of the press. This cover also prevented and was a pre-

caution against any obstruction under the draw ring plate as is customary when left open or exposed. This cover likewise prevented the operator from putting his hands between the die shoe and the draw ring plate.

Much consideration and attention was given to the draw edge, angles and radii, together with the desired tolerances between each draw or redraws which made possible these drawing results.

Apart from the successful accomplishment of deep drawing of zinc,

facts have been established respecting what has been done with zinc and what may be expected of it. Of course, it must be thoroughly understood that much depends upon the accuracy of the series of operations, together with the die design, construction and making, and while the drawing of zinc is in distinct contrast with the drawing of steel or brass, yet more can be accomplished with zinc if the principles explained in this article are adhered to or closely followed.

Purchasing and Handling of Heavy Fuel Oil

(Concluded from page 967)

pressure and allow the relief valve to maintain the desired line pressure. The meters and heaters should be by-passed to allow repair to be made.

Needle valves are not satisfactory when used as oil control valves for small burners, as they have a tendency to plug up when slightly open. A control valve having a triangular opening will pass larger particles of suspended matter when only partly opened. A valve of this type will continue to function properly long after any other valve has its opening clogged with dirt.

When steam is used for atomization a flame temperature of 2400 deg. F. can be obtained. Air will increase this to 2700 and some special burners will give as high as 3750 deg. About one pound of steam is used per gallon of oil at about one-sixth the cost of compressed air. The steam also adds heat units to the fuel which is transferred into useful heat. The steam must be dry as any water in the steam must be evaporated.

"General Consumer Market Statistics," published by the Bureau of Commerce as a supplement to its market data handbook, contains latest available data relating to location, size and purchasing power of general consumer, farm and industrial markets for American industrial products. Included in the supplement is a summary table, showing the total of each series of statistics by States and for the United States as a whole. A series of maps has also been added to indicate changes in many of the statistical data since the year for which they were previously collected and published in the market data handbook. Copies of the supplement are procurable at 60c. each from the Government Printing Office, Washington, and copies of the third printing of the market data handbook are available at \$2.50 each.

To Promote Use of Steel in Belgium

L. G. Ruequoui, director of Ossature Metale of Belgium, an organization which came into being in January this year with the object, among other things, of developing markets for steel, is now in the United States for a three months' study of what is being done in this country in the same category. The new association gets its main support from the steel makers, but includes among its members fabricators and engineers and architects. The term fabricator is used in the broad sense of comprising manufacturers utilizing all forms of steel as well as constructors of steel buildings and bridges. The association is devoted to the interests of Luxemburg and the Netherlands as well as Belgium.

Mr. Ruequoui was introduced to a group of steel representatives and members of the business press at a luncheon at the Hotel Roosevelt, New York, April 15, tendered by the American Institute of Steel Construction. He was presented by George E. J. Pistor, who was given the credit by Mr. Ruequoui for the germ of the idea out of which the association grew, Mr. Pistor having met with steel factors of Belgium and other parts of Europe in 1929.

Mr. Ruequoui received a degree in engineering from the Massachusetts Institute of Technology in 1923 and speaks English exceptionally well. He may be reached in care of the American Institute of Steel Construction, 200 Madison Avenue, New York. He proposes to include in his investigations such matters as transmission towers, steel furniture, steel barrels and steel railroad cars. He mentioned the recent completion in Antwerp of an office building 26 stories in height from the foundations and said many buildings of 10 to 15 stories are being erected in Brussels, Liège and Antwerp.

American Refractories Institute will hold its annual spring meeting in the William Penn Hotel, Pittsburgh, on May 18.

